# INDUSTRIAL MEDICINE AND SURGERY

## INDUSTRIAL MEDICINE

*The International Journal of Medicine in Industry*


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*Volume 27* FEBRUARY, 1958 *Number 2*



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INDUSTRIAL MEDICINE AND SURGERY, The Journal of Medicine in Industry (with which are consolidated "The Industrial Doctor" and "International Journal of Medicine and Surgery"): Entered as second class matter August 28, 1941, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879. Reentered, October 3, 1949. Additional entry at Sheboygan, Wisconsin. Published on the fifth of each month by INDUSTRIAL MEDICINE PUBLISHING COMPANY, Chicago. STEPHEN G. HALOS, Chairman; HAROLD A. HOOPER, Treasurer; STEPHEN F. HALOS, President; A. D. CLOUD, Publisher; CAREY P. MCCORD, M.D., Editor; DORIS L. FLOURNOY, Managing Editor; LUCILLE H. GROSS, Circulation Manager. Member, Audit Bureau of Circulations. PUBLICATION, EDITORIAL AND EXECUTIVE OFFICES, 605 North Michigan Avenue, Chicago 11, Illinois. Miami Office, 5301 S. W. 76th Street, Miami, Florida. Subscription $6.00 per year in the United States; $8.00 (U.S. Currency) per year in Canada; $12.00 (U.S. Currency) per year in other countries. Single copies 75 cents. Title Registered in United States Patent Office. Registered Canada, 1942.


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INDUSTRIAL MEDICINE AND SURGERY
FEBRUARY, 1958

# Ophidiasis

## —An Unusual Occupational Hazard—

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OPHIDIASIS or snake venom poisoning is not of rare occurrence. Swaroop and Grab,[1] of the World Health Organization, estimated there are between 30,000 and 40,000 human deaths from ophidiasis each year throughout the world. Porges[2] thought there are between 2,000 and 3,000 cases of snake venom poisoning in the United States annually. Although most poisonous snakebites occur among children and persons engaged in out-of-door occupations, this intoxication may be considered an occupational hazard among persons routinely handling poisonous snakes, including professional and amateur snake collectors, scientists, museum curators, showmen, and religious faddists. Watt *et al*[3] described the case of a professional herpetologist who had survived the bites of 10 poisonous snakes over a 12-year period. Haast and Winer[4] reported the recovery of a serpentarium director who had received repeated bites by various species of poisonous snakes, including the blue krait *(Bungarus caeruleus)*. Benn[5] described the clinical course of an amateur snake collector who succumbed from the bite of a taipan. Parrish and Pollard[6] presented the case histories of 12 professional herpetologists and biologists who had experienced two or more poisonous snake bites. None of these patients exhibited clinical evidence of permanent immunity resulting from previous snakebites. In addition to these isolated case reports of snake venom poisoning, studies of large numbers of snakebites in various regions of the United States indicate that persons who intentionally handle snakes are frequently bitten. Minton[7] found that about one-third of 30 cases of snake venom poisoning in Indiana were among persons bitten while handling captive snakes or attempting to capture the reptiles. Wood[8] reported that 10 out of 44 snakebites among adults were in persons intentionally handling poisonous snakes. Githens,[9] in a study of snakebites in the United States, discovered that of 2,342 bites, 163, or more than one in every 15, were inflicted on persons handling poisonous snakes. Of these, 48 were in professional snake catchers, 31 were showmen at fairs or carnivals, and 23 were scientists studying snakes. Parrish[10] found that eight out of 71 deaths from poisonous snakebites in the United States during the period from 1950 through 1954 were among persons intentionally handling poisonous snakes.

The purpose of this report is to study the prevalance of ophidiasis among a group of persons who handle poisonous snakes routinely, to determine the conditions under which these



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snakebites occur, to study these patients' reactions to venom and antivenin, and to suggest ways to prevent these bites.

## Materials and Methods

THIS STUDY resulted from the author's observation that most of the employees of Ross Allen's Reptile Institute, Silver Springs, Florida, have been snakebitten one or more times. At the Institute, poisonous snakes are routinely "milked" to extract venom which is used for producing antivenin and for scientific research. Also various species of poisonous snakes are handled daily during lectures to tourists. From the members of the Institute the author obtained the names and addresses of other herpetologists, lecturers, amateur collectors, museum curators, and scientists throughout the state of Florida who handle poisonous snakes. A total of 41 persons in this unusual occupation, including 13 employees or former employees of the Institute, were interviewed by the author. In this group there were 15 professional snake handlers and lecturers, 12 amateur collectors, seven scientists, four herpetologists and three wild animal dealers. At the time of the interview, a complete history of previous poisonous snakebites was obtained. The following data were included: the number of poisonous snakebites, the severity of the bite, the species of snake inflicting the bite, the anatomical location of the bite, the patient's activity at the time of the bite, the presence of any symptoms suggesting allergy to venom or to antivenin (a biological made from horse serum). Hospital records were utilized to verify the reports in most instances. Only snakebites which produced venom poisoning were included in this study. It is possible for a poisonous snake to bite a person without injecting enough venom to produce signs and symptoms of venenation. The anatomical site of each reported bite was inspected for evidence of treatment (cruciate incisions, excision, or other scars) and sequelae. In addition, each individual was tested for hypersensitivity to horse serum and venom. The presence of hypersensitivity to horse serum was determined by giving 0.1 ml of a 1:10 dilution of normal horse serum intracutaneously. Fresh undiluted cottonmouth moccasin *(Agkistrodon piscivorus)* and eastern diamondback rattlesnake *(Crotalus adamanteus)* venoms were utilized in scratch tests to detect venom allergy. The technique for these tests has been described in detail in a previous publication.[11]

## Results

OF 41 PERSONS who handle poisonous snakes routinely, 32 (78%) have been snake bitten one or more times. Eighteen of these individuals had one poisonous snake bite, five had two snake bites, one had three, three had four, one had five, two had six, one had 10, and one had 12. Thus, these 41 persons had a total of 82 snake bites — an average of two per person. Contrary to what one might have expected, experience in handling snakes was not a major factor in determining the frequency of snakebites. For example, the patient with 10 previous snakebites is an internationally known herpetologist whose technique in handling snakes has been described by one of his associates as, "so good that when he picks up a snake, the snake doesn't know he is being handled." In general, the nine individuals who have escaped being bitten have not handled snakes for as long or as often as those who were bitten. Also they more often use a snake hook rather than their bare hands. Thus, the individuals who have not been snakebitten had less risk due to a decreased amount of exposure.

The activity of the patient at the time of the snakebite was as follows: milking a captive snake of venom — 13; attempting to pick up a snake in the woods — 12; bitten on leg above boot while standing in snake pen — nine; picking up a captive snake — eight; holding snake during lecture or demonstration — seven; attempting to feed snake — seven; handling a dead, or presumably dead, snake — six; bitten on leg (no boots) while standing near snake — five; putting snake in bag — five; releasing snake after handling — four; removing snake from a box — three; bitten through cloth bag in which snake was kept — two; and measuring length of snake — one. The majority, 56, of these poisonous snakebites were inflicted by captive snakes, whereas 26 bites were inflicted by snakes in their natural habitat.

Closely related to the victim's activity at the time of the bite was the anatomical site of the bite. With the exception of one bite on the shoulder resulting from carrying a snake in a bag, the remaining bites occurred on the extremities. The sites of the bites on the extremities were as follows: 48 on the fingers or hand, 13 on the forearm, nine on the leg above the knee, five on the leg below the knee, four on the foot, and two on the upper arm. It is not surprising that 63 (77%) of these venomous wounds occurred on the upper extremities, since snakebites among these individuals most often resulted from handling the reptiles. By way of contrast, in studies of snakebite cases in the general population only about 40-45% of the bites were inflicted on the upper extremities.

The severity of venom poisoning depends on a number of factors including the size and species of the snake; the nature and location of the snakebite wound; the age, weight, and general condition of the victim; and the toxicity of the venom of the specific snake. Wood, Hoback, and Green[12] have provided an excellent clinical clas-



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TABLE I.
SEVERITY OF POISONOUS SNAKE BITES BY KIND OF SNAKE INFLICTING THE BITE

| Kind of Snake | Severity of Venenation* I | II | III | Total |
|---|---|---|---|---|
| Rattlesnakes (Crotalus sp.) | 9 | 10 | 11 | 30 |
| Pygmy rattler (Sistrurus sp.) | 10 | 3 | 1 | 14 |
| Cottonmouth moccasin | 8 | 5 | 4 | 17 |
| Copperhead moccasin | 8 | 8 | 2 | 18 |
| Other | 1 | 1 | 1 | 3 |
| Total | 36 | 27 | 19 | 82 |

*Severity of venenation, ref. (12).
I = Minimal venenation.
II = Moderate venenation.
III = Severe venenation.

sification of the severity of snakebites due to the venom of pit vipers. They classify bites as grade I, II and III venenation depending on the resulting signs and symptoms and the patient's course of hospitalization. Table I shows the severity of 82 snakebites by the species of the offending reptile. The bites of rattlesnakes *(Crotalus sp.)* and cottonmouth moccasins more frequently produced cases of grade III — severe venenation. The bites of copperhead moccasins and pygmy rattlesnakes *(Sistrurus sp.)* were much less dangerous. There was no evidence that these individuals suffered more cases of severe venenation while handling snakes than persons in the general population who are snakebitten. For example, this occupational group had 44%, 33%, and 23% cases of grade I, II and III venenation, respectively, as compared to 41%, 39%, and 20% cases of grade I, II and III venenation for the general population in the same state.[13]

Tests were made in these 41 individuals to determine the presence of allergy to snake venom and to horse serum, from which antivenin is made. The nine persons who have not been snakebitten presented no clinical or laboratory evidence of allergy. Of the 32 patients with one or more previous snakebites, six had positive scratch tests to snake venom, and eight exhibited hypersensitiveness to horse serum. It is interesting that six of the eight patients with allergy to horse serum have received large amounts of antivenin (20-100 cc) and five of them have a history of serum sickness following the administration of antivenin. I can think of no other instance in modern therapeutics in which such a large dose of horse serum (10-50 cc) is given during such a short period of time. Of course, the amount of horse serum given is one of the important determining factors in the pathogenesis of serum sickness. I have treated two patients who exhibited no evidence of hypersensitivity to horse serum by the usual intradermal tests but who developed serum sickness following large doses (20-50 cc) of antivenin. Reid[14] recently reported a case of serum sickness in himself following snakebite treatment with antivenin, and reviewed the literature on this subject. These findings plus the danger of anaphylaxis emphasize the importance of skin testing an individual for hypersensitivity to horse serum before administering antivenin.

## Prevention

A PERSON handling or in the vicinity of a poisonous snake should try to focus his attention on the snake. Most of these experienced snake-handlers confessed that bite accidents occurred when they were inattentive, took unnecessary chances, or underestimated a particular snake's ability. Nine of these bites might have been prevented if the victim had been wearing boots. However, boots which extend to just below the knee do not offer complete protection, as nine other patients were bitten on the leg above the boots. Quite astonishingly six individuals received envenomation from a dead, or presumably dead, snake. Three of these persons received envenomation when they inadvertently pricked their finger on a dead snake's fangs. One must remember that the fangs and venom supply of a recently killed snake remain intact.

This study indicates that one of the most likely times for a bite to occur is while picking up or putting down a poisonous snake. Many persons handling poisonous snakes may receive bites resulting in either no venenation or minimal venenation and conclude that snakebites are not really dangerous. However, they need to be reminded that each bite is potentially dangerous and may result in severe venenation or death. Also there is no clinical or laboratory evidence that a previous poisonous snakebite by a pit viper confers permanent immunity.[6] Each person working with poisonous snakes should wear snake proof boots and long thick trousers. Fifteen bites which were inflicted on the forearm or upper arm might have been prevented or rendered less serious if a leather jacket or other protective clothing had been worn. In addition, snake handlers should carry a snakebite first aid kit with them. If a bite with evidence of venenation occurs, prompt first aid measures including the use of a tourniquet with incision and suction should be employed. The services of a physician should be obtained as soon as possible. The sooner treatment is begun the better the chances are for a favorable outcome.

In institutions where poisonous snakes are routinely handled, specific antivenin for all poisonous species should be available. Each employee should be skin tested for horse serum sensitivity beforehand so that treatment with antivenin need not be delayed. In addition, persons with previous snakebites or with clinical symptoms of venom allergy should be skin tested for hypersensitivity to snake venom. The physician should be informed of the patient's sensitivity status to horse serum and venom at the



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time of treatment. The use of cortisone, ACTH, epinephrine hydrochloride, and antihistamine drugs may help counteract some of these allergic manifestations.


## Summary

OPHIDIASIS (snake venom poisoning) is an occupational hazard among persons who intentionally handle poisonous snakes, including professional and amateur snake collectors, scientists, museum curators, showmen and religious faddists. This study of 41 persons who handle snakes routinely disclosed that 32 (78%) have been snakebitten one or more times. There were 82 instances of ophidiasis, or an average of two bites per person. The amount of exposure rather than experience in handling snakes was the most important determining factor.

Fifty-six bites were inflicted by snakes in captivity, whereas 26 bites were caused by snakes in their natural habitat. With one exception, all of the bites occurred on the extremities: 63 (77%) were on the upper extremities. Rattlesnakes *(Crotalus sp.)* and cottonmouth moccasins were responsible for most cases of severe venom poisoning.

By means of intracutaneous tests with horse serum and scratch tests with fresh snake venom, six patients were found allergic to snake venom, and eight exhibited hypersensitivity to horse serum (from which antivenin is made). Five patients gave a history of serum sickness following the administration of antivenin.

The prevention of snakebite accidents among this occupational group is discussed.


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# The Beginning

THE WORKING TRAIT most useful to our pioneer forefathers was rugged individualism. The gauge of a man's success was his ability to provide for himself by his own unaided efforts. . . . today, our most useful working trait is the ability to work effectively with others. For the material things of life at least, none of us can or wants to be completely independent — our aim is rather so to relate our various specialized skills as to achieve an effective interdependency. No longer are we jacks of all trades — nor do we want to be. The pattern of working together as a team came first and most easily on the production line. Translating this work pattern to the less tangible jobs that need to be done, however, has proved more difficult. Yet it is in this area of the intangibles that advance is most important if we are indeed to keep our human adjustment in pace with scientific progress. And the focal point of challenge is in the field of health since health, in its broadest sense, encompasses the happy and productive relationship of man to man and of man to his environment. Therefore, I think it no exaggeration to claim that the health professions and the industrial interests have a major and mutual responsibility in preventing mankind from becoming obsolete. And our success depends largely upon the effective patterns of teamwork we are able to evolve. The industrialist and the doctor have had a limited partnership for a long time. I do not know when the first factory owner called in a doctor to find out why healthy workers became ill soon after working in his plant; nor do I know when the first engineer entered the scene to build out the cause of the illness once the doctor had identified it. But whenever it was, that was the beginning of public health-industry partnership.

—From a speech by LEROY M. BURNEY, M.D. United States Surgeon General, at the Convocation on Industrial Health, Seton Hall University, South Orange, New Jersey, December 3, 1957.

# Regional Block Anesthesia for Surgery of the Fingers and Thumb

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INJURIES of the fingers and thumb are the most common of the many traumata that are sustained by the body. They are often treated under various anesthetic techniques which constitute a real threat to the life of the finger.

Lacerations and abscesses have been frozen with a spray of ethyl chloride. This procedure adds freezing of the tissues to the trauma already received. It not only fails to provide good anesthesia, but also causes increased pain after thawing occurs.

The usual textbook picture of finger anesthesia over the past 60 years shows a traumatized finger with an elevated area of bloated tissue as a ring at its base (Fig. 1). Fig. 2 sketches the tissues beneath the skin. Note that the anesthetic solution (5 to 10 cc are usually recommended) forcibly distends and compresses the relatively inelastic tissues. The lymphatic return is first shut off, then the venous circulation, and then the arterial blood supply.

Such pressures effectively arrest all circulatory exchange. When epinephrine is in the solution, the vascular shutdown is prolonged. If these two factors — pressure and vasospasm — do not initiate thrombosis, the rubber band that is usually placed over this traumatized area may ensure the development of thrombosis.

The literature[1,2,3] reports over 30 cases of gangrene of the finger from the use of these sinister blocks. If only 30 instances of gangrene have been reported, one may assume that there have been many more that have not been reported.

In the past two years, I have administered 93 regional blocks of the fingers and thumb by the following technique without thrombosis and without blanching of the digit at surgery.

## Regional Digital Nerve Block of the Fingers

WE HAVE used both 2% procaine and 2% xylocaine without noting any difference in onset or duration of effect. Epinephrine was used in a dilution of 1:200,000 for all blocks. Complete anesthesia was always attained before cleansing the injured part.

Figs. 1a and 5a show the area of the skin that was cleansed prior to administration of the anesthetic solution. Most industrial injuries are incurred by men with soiled hands. When they arrive at the office, bleeding has usually ceased. After examination of the injury, the injured area is covered with sterile gauze. The palm and dorsum of the hand are scrubbed with a weak solution of gentian violet in 70% alcohol as pictured. The solution, of course, is not allowed near the denuded tissues.

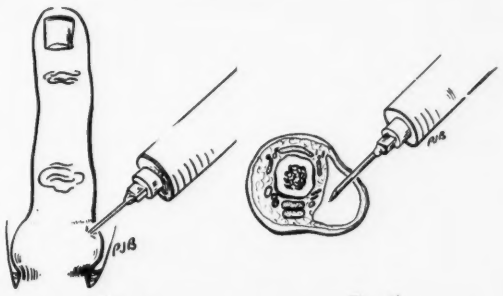

Fig. 1a. Fig. 1b.
(a) Traditional finger block. (b) Compressed vascular tissues within finger.

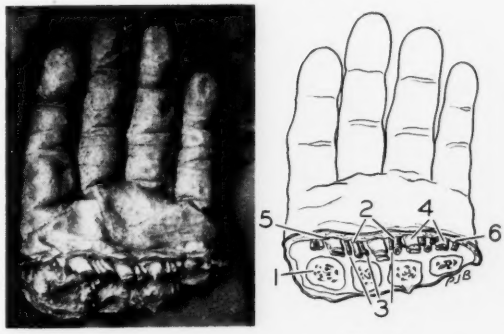


Fig. 2a. Fig. 2b.
Cross section of hand at distal flexion crease. Volar tissues. 1. 2nd metacarpal. 2. Common palmar digital arteries. 3. Palmar digital nerves. 4. Long flexor tendons in their sheaths. 5. Palmar aponeurosis. 6. Subcutaneous fat of palm.

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A 2-cc syringe is filled with the 2% anesthetic solution and epinephrine. A short, No. 25 needle is pressed just into the skin in the palmar distal

Fig. 3a.

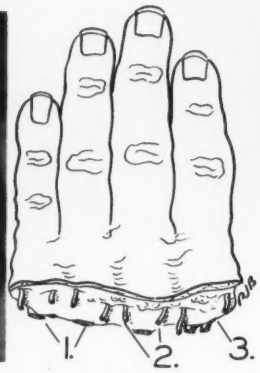



Fig. 3b.

Cross section of hand at distal flexion crease. Dorsal tissues. 1. Common extensor tendons within dorsal aponeurosis. 2. Dorsal digital nerves. 3. Dorsal aponeurosis.

Fig. 4a.
Site of palmar injection.

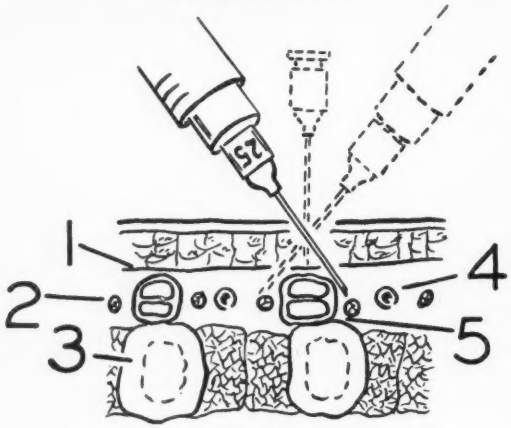



Fig. 4b.

Cross section: 1. Palmar fascia. 2. Volar digital nerve. 3. Metacarpal. 4. Common palmar digital arteries. 5. Long flexor tendons and sheaths.

Fig. 5a.
Site of dorsal injection.

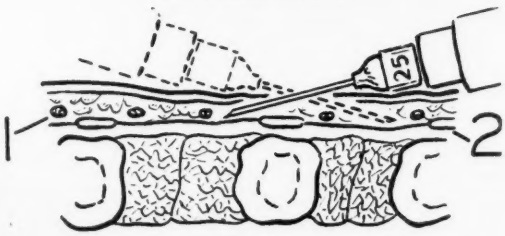



Fig. 5b.

Cross section: 1. Dorsal digital nerve. 2. Common extensor tendon.

flexion crease over the long flexor tendons of the injured finger, and an imperceptible amount of solution is injected (Fig. 4b).

The needle is then pressed on into the subcutaneous fat (Fig. 4b) where two or three minims are deposited. Now the needle is directed to one side of the tendons and pushed just through the palmar aponeurosis. The needle penetrates this structure with a clearly palpable "plop." After careful aspiration, ½ cc of solution is deposited here. The needle tip is then withdrawn into the fat. It is then directed to the other side of the tendon where another ½ cc is deposited in the neurovascular space.

The hand is pronated and a similar area of skin is cleaned on the dorsum of the hand just proximal to the head of the metacarpal. The needle is similarly passed through the skin where two or three minims of solution are deposited (Fig. 5b). The needle is then passed to its full length of 5/8 inch at right angle to the metacarpal shaft. One-half cc of solution is deposited throughout its length. The needle is withdrawn until the tip is just beneath the skin. It is directed in the opposite direction where the remainder of the solution is injected.

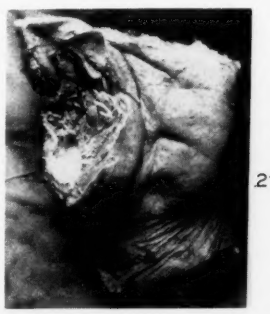
Both the volar and dorsal areas are lightly massaged for less than a minute. Complete anesthesia occurs in 10 minutes. The surgeon who has cleansed his own hands and applied sterile gloves may then commence the soap and water cleansing of the injured hand.

### Regional Block of the Thumb Nerves

A SIMILAR regional block of the nerves of the thumb is employed. The long flexor tendon is palpated in the center of the thenar eminence. This is easily accomplished when the patient attempts to flex his thumb against resistance. A site over the tendon is chosen about one centimeter thenarward from the cross that is made by the midpalmar flexion creases (Figs. 6a and b). The skin and subcutaneous fat are infiltrated. Although the muscles are enclosed by thin fascia, there is no definite aponeurosis by which one may judge his depth. The needle, therefore, is directed to either side of the long flexor tendon and inserted so that the tip is judged to be on a plane just lateral to the tendon. One-half cc of solution is deposited on either side of the tendon.

The lateral surface of the hand is placed down on the table with the thumb side up, (Figs. 8a and b). A site is chosen over the midline of the base of the first metacarpal where the skin and fat are similarly infiltrated. The needle is passed in the subcutaneous fat to either side where the remaining cc of solution is distributed.

Both sides are gently massaged. Anesthesia of the thumb is complete in 10 minutes.



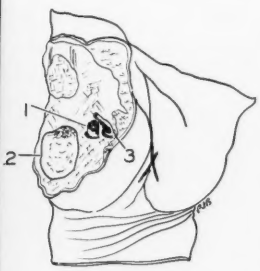



Fig. 6a. Fig. 6b.
Section of thenar eminence. 1. Tendon of flexor pollicis longus. 2. 1st metacarpal. 3. Bifurcation of thenar (median) nerve. Note that it is about 1.0 cm distal and thenarward from "cross" of flexion creases.

Fig. 7a. Fig. 7b.
Section through base of thumb. Volar tissues. 1. Flexor pollicis longus tendon. 2. Volar thenar nerves. 3. 1st metacarpal.

Fig. 8a. Fig. 8b.
Section through base of thumb. Dorsal tissues. 1. Dorsal thenar (radial) nerves.

### Comment

THE SITES chosen for regional block of the volar nerves are neurovascular spaces completely enclosed by fibrous sheaths. The spaces, of course, are open proximally and distally. The anesthetic solution, therefore, can permeate only these spaces. The amount of solution used appears to be too small to cause compression of the vascular tissues.

Paresthesias are not sought. If the patient complains of pain distal to the site of injection, the needle is moved before injection.

It is necessary to recall that the dorsal sensory nerves traverse only the subcutaneous space. They do not lie below the dorsal fascia. The surgeon must be careful not to penetrate the dorsal aponeurosis. He must be careful when injecting both dorsally and ventrally to avoid the tendons, tendon sheaths, and the nerves which manifest their impalement by paresthesias.

### Summary

A METHOD of regional block of the digital nerves that was used in 93 cases is presented as a substitute for the sinister circular block at the base of the finger or thumb.

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# A Medical Department in a Small Industrial Plant

## —A TEN-YEAR STUDY, 1947-1956

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MANY medical plans have been devised to take care of the small industrial plant. In the South[1] and the Northeast[2] a number of plants are taken care of by a central medical unit. However, here at General Diaper Service, a medical plan for a single small industry has been in successful operation for the past 10 years.

### The Plan

PHYSICAL LAYOUT: The Medical Department has an area of 225 square feet, which is divided into three rooms of about equal size — a waiting room, a consultation room, and an examination room with a lavatory. Within these confines, all the equipment that is necessary for diagnosis, immediate therapy, and minor surgery is available. A file, kept under lock and key and accessible only to medical personnel, maintains all the records.

PERSONNEL: To take care of a roster which used to be near 250 employees but which has been slowly reduced to approximately 200 — equally divided between the sexes — a physician, a registered nurse, and first aid workers are required. The physician is in attendance three times a week for two hours each time. The hours are predetermined but vary from session to session. He usually is present in the early part of the morning, or in the late afternoon, in order to be available for the employees of overlapping shifts. In addition, he is always available for consultation and emergencies. The registered nurse is present every day for three hours. Here again, the hours are predetermined but are at different times of the day. The reason for this, as for the physician, is to have the nurse available to as many people as possible at all times. First aid workers, one for each department, take over whenever the physician or the nurse is not in attendance. The first aid worker is trained to take care of all minor cases. In order to assist him, written instructions are available. If, for any reason, the first aid worker is not able to take care of the case, or, if it comes outside the category of the written directions, he is instructed to call the physician.

### The Program

THIS comprises: physical examinations; safety; therapy; engineering; absenteeism.

I. PHYSICAL EXAMINATIONS: There are three types of physical examinations:

A. *Preplacement:* Every applicant for employment receives a complete physical examination, including a urinanalysis, hemoglobin de-

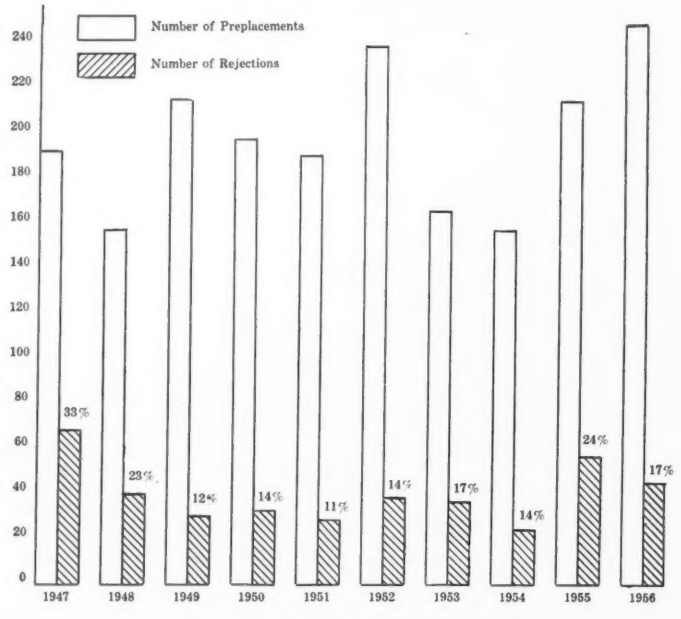


Fig. 1.

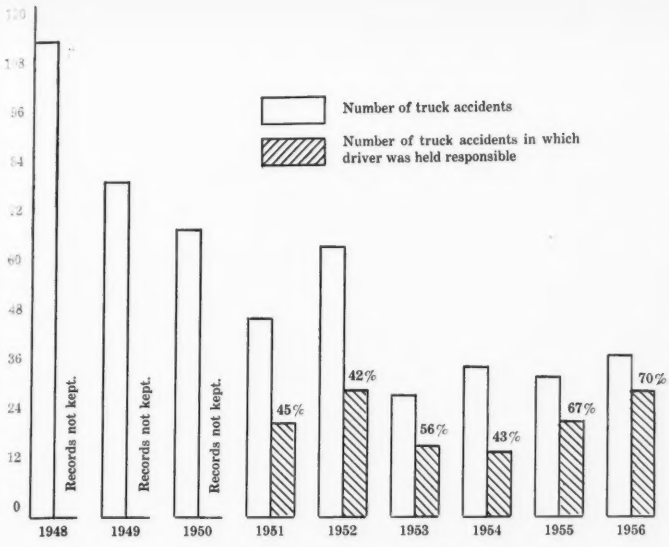


Fig. 2.

termination, blood serology, chest x-ray, and any other tests deemed necessary. In addition, a psychological form of interview is held, together with an aptitude test, which is done by the Personnel Department, in order to determine whether the prospective employee is able to get along with his supervisor, his fellow employees, and may or may not be happy and able to do his work. Each position has a different set of standards. Based on these findings, a profile classification similar to that of Brandelone and Friedman[3] is made. The applicants are then classified as follows: (A) Can do any kind of work. (B) Can do the type of work for which they applied, but may or may not be able to do other types of work. (C) Can do only the type of work for which they applied. (D) Cannot do any type of work.

A written report is given the Personnel Department. If A, B, or C is reported, no comment is made. If D is the finding, reasons are set forth. As a result of this procedure, the turnover has been kept to a minimum. Furthermore, within the 10 years this plan has been in operation, not one hernia case has occurred on any new employee. Back injuries have been kept to an absolute minimum, with no loss of time. Knee injuries have been nil. Fig. 1 shows the preplacement examinations that were done for each year, together with the unsuccessful applicants.

B. *Routine Physical Examinations:* An annual physical examination, on a voluntary basis, similar to the preplacement physical is offered to each employee. The findings are discussed with the individual, and are kept in strictest confidence. As a result of this form of examination, more employees come into the Medical Department to avail themselves of diagnostic work. In this manner many different forms of illness have been picked up, including blood dyscrasias, malignancies, peptic ulcers, and a variety of other ailments. All these people are encouraged to seek their own physician. Inasmuch as the average employee in this industry will seek medical attention only when he or she is in pain, this routine annual physical examination is a boon to them, for, in this manner, they are able to seek medical attention not after the ailment is out of hand, but while it may be placed under control. In addition, they receive instructions in many preventive health measures.

C. *Other Examinations:* At times an employee will be asked to undergo a physical examination at the request of management — for promotion, job performance, sick leave, or to determine some other factors in which management is interested. Here, the employee gets the same examination as above. However, this examination is not done until the written consent of the employee is obtained for the results to be made available to management.

II. PREVENTIVE MEASURES: No industrial medical program is of real value unless all available preventive measures are included. We try to stimulate the thoughts of the employees by posters, motion pictures, displays, and short articles which are mimeographed and distributed to each individual. One subject is stressed every month. The topics are diversified, and vary from all forms of health measures and early treatment of disease to safety in all its phases — in the home; industry; on the road — and to hobbies, and how to prepare for old age.

From a practical point of view, all preventive measures are offered free to the employees and on company time. To illustrate, in the smallpox scare of 1947 over 70% of the employees were vaccinated right in the plant without a day lost. Influenza virus vaccine injections are proffered to them twice a year. At the present time, plans are being made to make the Salk vaccine available to the employees.

In addition, a Safety Committee is in operation. This will be discussed below. A cafeteria has been established in the plant and is run by nonemployees on a profit basis. However, the cleanliness and the meals that are offered are supervised by the Medical Department. Whenever conditions arise that need particular attention, methods are instituted to correct them. At one time cleanliness among the employees was



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on the downgrade. To overcome this, a Cleanliness Committee was established. Within a period of two years the plant became a comparatively model place to the extent that the Committee was not required to function.

To promote safety on the road, all motor vehicle accidents are immediately reported to the Medical Department. As soon as three nonresponsible accidents occur within a year, or two responsible accidents occur within any period, that driver is required to report for examination in order to seek a physical or mental cause. Correction of the findings usually makes the motor vehicle operator a safe driver. By this method, together with the educational measures utilized above, and close cooperation with the Fleet Supervisor in having the car on wheels a safe easy machine to operate, accidents have been cut as much as 75% (Fig. 2). This becomes more remarkable when one takes into consideration the fact that motor vehicle operators have actually increased in number from 20% to 33⅓% of the employee roll.

III. THERAPY: Treatment is divided into two phases:

A. *Compensable Cases:* Every employee who is injured, no matter how slightly, is checked by the Medical Department personnel. Treatment is offered only on a voluntary basis and after signing the appropriate forms as promulgated by the New York State Labor Department.

B. *Noncompensable Cases:* Here, only that form of therapy is offered which we, in the Medical Department, can give to them so that they may be able to return to work. In other words, only minor cases are treated. No medication is given to take home, nor are any prescriptions written. If the cases go beyond immediate relief, they are encouraged to seek the help of their own physician. Of course, there are cases in which diagnosis is essential. We will do everything in our power to aid their own physician to reach a diagnosis and will cooperate with him to the utmost degree. However, therapy will only be given them upon written instructions and consent of their own physician.

Fig. 3 shows how markedly the number of industrial accident cases has decreased. To complement this, the severity rate has been greatly diminished, as shown in Fig. 4. In this connection, it is worthwhile to note that in one year we had 50 skin cases. Within a short time the cause of this skin condition was found, the offending agent was eliminated, and we have not had any trouble of a similar sort to date.

IV. ENGINEERING: In a large establishment a safety engineer usually takes care of this phase. However, in a small plant where it is not practical to employ a safety engineer, this phase of prevention devolves upon the medical person-

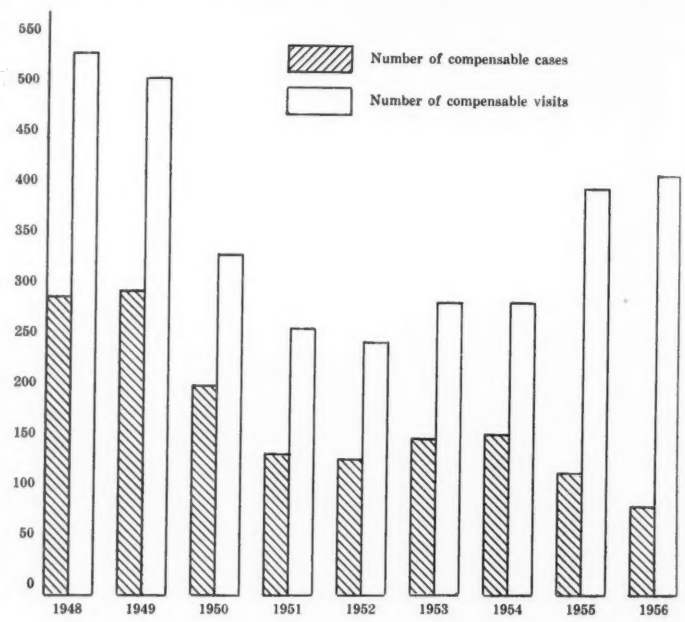


Fig. 3.

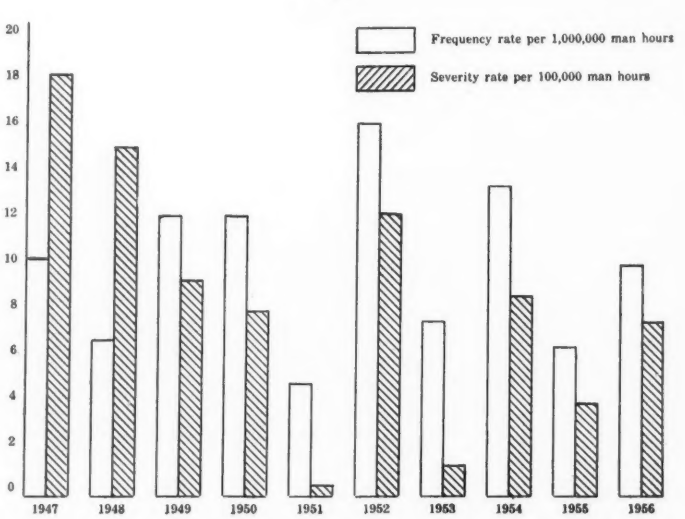


Fig. 4.

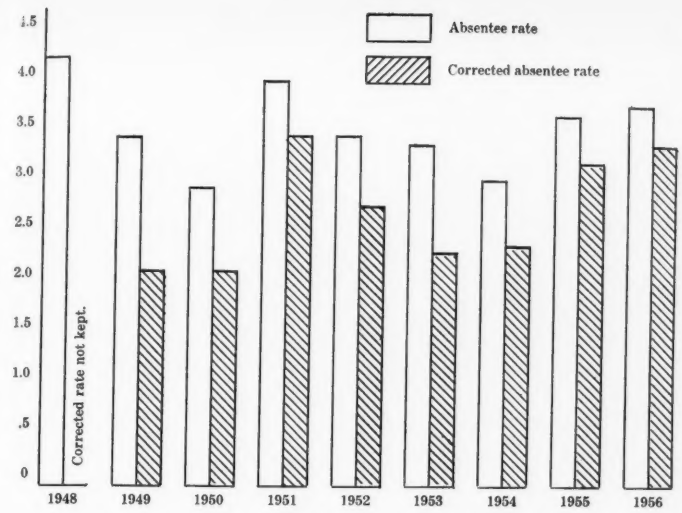


Fig. 5.

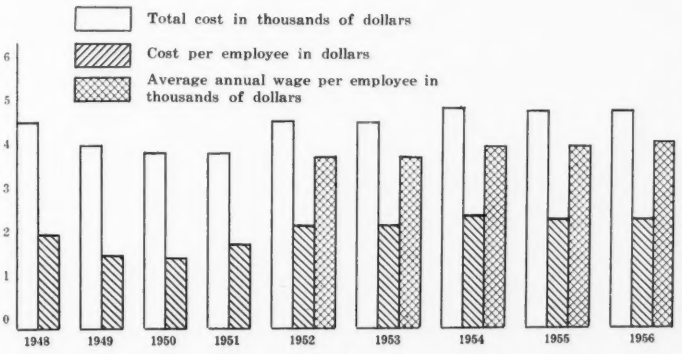


Fig. 6.

nel. Among its more important functions is the establishment of a Safety Committee. Its membership includes one employee from each department who is not of the supervisory level. Once a month a complete tour of the plant is made in order to pick out anything that may interfere with proper working conditions. In other words, it is not only safety that is stressed, but also cleanliness, speed, and happiness. Minutes are kept and the Committee's recommendations are sent to maintenance and management. In this manner, not only are the safety devices taken care of but also all the personal factors that interplay are studied. Thus an opportunity is afforded to find the cause of injury in the accident-prone individual, the reason why efficiency in an individual or department is not up to par, and why a chronic absenteeism exists. Elimination of these etiological factors will of necessity raise the standard of the plant.

In addition, the Medical Department takes pains to see that proper colors are placed upon pipes, wires, and safety equipment in accordance with standard engineering practices. Lighting facilities are constantly checked with a light meter. Colors are recommended when redecorating is done. Noises are evaluated with a sound test meter and diminished whenever the decibel count is above recommended levels. Furthermore, strife among employees or between supervisor and employee is minimized. All this tends to improve the working conditions by making the lot of the employee a happier one.

V. ABSENTEEISM: I have been advised that prior to 1947 the absentee rate was well above 5%. Fig. 5 shows that the absentee rate has been cut down to an average of about 3.5%. In this connection, it is worthwhile to note that the absentee rate includes all people who are absent regardless of cause. No excuses are accepted, no matter how valid they may be. In order to get a truer picture of the absentee problem, employees who have been absent for 20 days or more in the preceding year are eliminated. This rate is called the corrected rate. Special attention is paid to those employees who are excluded here, in order to try to eradicate their absenteeism. The value of this procedure can be seen from Fig. 5, which demonstrates that the difference between the regular and the corrected rate is slowly diminishing.

In order to reduce the absentee rate, every employee who is absent for two days or more is required to report to the Medical Department. It is felt that, by this method, minor conditions which keep a person out can be corrected before they become major problems. Furthermore, at times, an employee may attempt to return to work before he or she is fully recovered.

VI. COST: Just as with other equipment, the cost of the Medical Department must be considered. Fig. 6 shows the total outlay, with the cost per employee per year. The amount stated includes wages, and costs of supplies and space, together with depreciation of equipment. The inflationary spiral that has persisted in the past five years is reflected in the cost of the Medical Department. However, a comparison with the average annual wage per employee shows that, whereas wages have increased by 12½%, the cost of the Medical Department per employee has increased only 10%.

As a matter of fact, over the past two years the cost per employee has decreased by 4-5%.

## Comment

A MEDICAL DEPARTMENT in an industrial plant, and particularly in a small one, must satisfy the employees as well as management. Under the above described plan the employees evidently are content. Fig. 7 shows that the number visiting the Medical Department over the 10-year period has increased in spite of the fact that there has been a 20-25% reduction in the working force. In addition, Fig. 7 shows that the percentage who visit the Medical Department and are seen by the physician is constantly increasing. Fig. 8 indicates that with each succeeding year more and more are voluntarily coming in to get physical examinations. Since every year more and more have been consulting the Department for nonemployment conditions, it would seem that they must have accepted the program as a service that is worthwhile to them.

From management's viewpoint, all this boils down to a question of dollars and cents. Selecting the right individual for the job has caused a diminution in turnover. The stressing of preventive measures has caused a decrease in absenteeism, together with an increase in the individual productivity of the employee. Since all accidents are checked immediately upon occurrence and attempts are made to eliminate them in the future, the incidence of injury is kept low. Fig. 4 proves that, although the frequency rate has diminished only slightly, the severity rate has decreased markedly over the 10-year period. Fig. 3 shows how an effective medical program can decrease the number of industrial accidents that occur over the years. However, this goes one step further. The decrease in industrial accidents means that there also has been a decrease in nonindustrial accidents. If, to all this is added the fact that the individual employees are kept in the best of health at all times through health education and counseling, it becomes a reality that the most is obtained from each one. A 75% reduction in the incidence of motor vehicle accidents (Fig. 2) and a near 2% reduction in the absentee rate (Fig. 5) causing the elimination of over-time pay are indicative of some of the savings to the company. Thus it is felt that both management and labor have gained quite a bit.

## Summary

A MEDICAL program for a small industrial plant has been described. Statistics as to the value of such a program have been given. Results show that both employer and employee benefit from an industrial medical program in a small industrial plant.

(8729 — 95th Street.)

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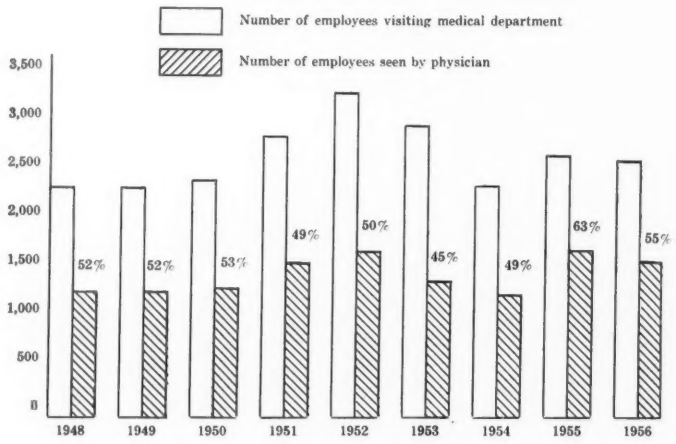


Fig. 7.

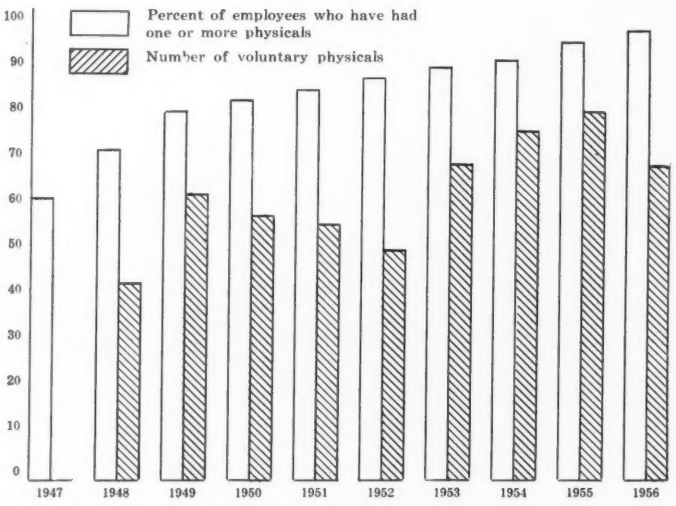


Fig. 8.

# Preoperative Evaluation for Major Surgery

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THE ULTIMATE outcome of any major surgical procedure depends as much upon a careful preoperative evaluation as upon the surgical technique and postoperative care. Since life expectancy is greater today, we may consider repair of a hernia for a patient's comfort alone or the removal of a gallbladder for silent gallstones. Elective surgery is justified, however, only after a consideration of risk in comparison with life expectancy. The attention given to minor details in the evaluation of each patient will prevent many postoperative difficulties.

A frequent reappraisal of postoperative complications may prove helpful in assuring a continued lowering of morbidity through better preoperative evaluation. A recent study of the postoperative complications on the general surgical services of the University Hospital showed a surprisingly high rate with major procedures.[1] Wounds, gastrointestinal and pulmonary complications are the most frequent; however, urinary retention was not considered a complication in this study. Many of these complications are due to surgical technique but others reflect upon a preoperative status which might be changed through a more careful preoperative evaluation.

The preoperative evaluation of the patient for major surgery involves a general survey plus an analysis of the functional and reserve status of several organ systems (Fig. 1). In only occasional cases are complicated special tests required. Attention must be given to minor details. In addition, the nutritional as well as the psychological status of the patient must be carefully considered. Mental clarity in the older age group is essential, and ambulation must be practiced preoperatively if it is to be successful following surgery. When complicating medical diseases exist or the surgical risk is great, consultation should be obtained.

## Cardiorespiratory Systems

THE assumption that heart disease is a common cause of surgical morbidity and mortality is not entirely correct. The incidence of cardiovascular complications is relatively low and fatal coronary occlusion is quite uncommon in comparison with other complications. On the other hand, atelectasis, pneumonia, and slowed venous return leading to phlebothrombosis are related both to the cardiac status and the preoperative pulmonary reserve of the patient.

The evaluation of cardiorespiratory reserve is not difficult and in most cases requires no special tests.[2] All of the leads of the electrocardiogram will not tell as much about the cardiac status as even a brief walk down the hospital corridor with the patient while observing his respiratory rate and discussing his recent vigor and symptomatology. The patient who has worked until the time of hospitalization should withstand surgery well. Orthopnea, decreased exercise tolerance, angina, ankle edema not of nutritional origin, and a coronary occlusion within three months are findings which have been accepted as factors increasing surgical risk and therefore require deferral of strictly elective procedures.

Postoperative atelectasis is as much due to previously uncorrected chronic bronchitis as to anesthesia. Simply asking the patient to cough may be enough to warn that elective surgery is best deferred lest a preoperative smoker's cough become a postoperative death rattle. Despite the

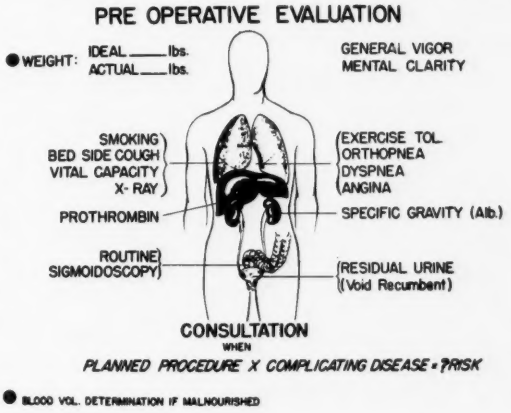


Fig. 1.
An evaluation is made of the general vigor, nutritional status, and the functional and reserve status of several organ systems. In most cases complicated laboratory tests are unnecessary.

fact that a large majority of patients today are chronic smokers, all too frequently these patients are not required to stop smoking even while in the hospital just before surgery.

The determination of vital capacity can be considered an inadequate test of total pulmonary function; but as a screening test easily performed by the nursing personnel it gives very helpful information. When the vital capacity is less than 2,000 cc all but emergency surgery should be deferred. If a cough or decreased vital capacity exists this can often be corrected in a few days by the cessation of smoking and by the use of aerosol inhalations with deep breathing exercises to clear the bronchial tree. Failure to improve the vital capacity of the patient suggests serious lung disease. This will be confirmed in routine chest films and greatly increases the surgical risk. In many elderly individuals emphysema will be the primary cause of decreased vital capacity. While this cannot be corrected prior to operation the clearing of the bronchial tree makes less likely the retention of carbon dioxide with its associated respiratory acidosis in the postoperative period. When the emphysema is severe an evaluation should be made to determine if compensated respiratory acidosis already exists in the preoperative period.

### Urinary Tract

WHILE the female patient experiences the passage of a catheter at least once before surgery the male must wait his turn until the postoperative period. The postoperative occurrence of urinary retention is ascribed to ileus, abdominal pain, or to the anesthetist, and is accepted as a frequent sequela of major surgery. On the other hand, it should be considered that if the patient cannot void while recumbent before surgery it is doubtful that he will master the trick while suffering the discomforts of major surgery. It therefore becomes a part of preoperative evaluation to be sure that the patient can void while in bed if catheterization is to be prevented following surgery.

A surprisingly large number of male patients who develop urinary retention following surgery have a urinary residual before surgery. In an evaluation of 700 patients over 50 years of age with inguinal hernia 195 were found to have a urinary residual and 71, or 10%, of all these patients with hernia required catheter or surgical relief of urinary obstruction before or after the inguinal hernia was repaired (Fig. 2). Benign prostatic hypertrophy was the most common cause of obstruction, but 15 patients were found to have carcinoma of the prostate. These findings strongly support the need to evaluate the elderly male before elective surgery. Dribbling, nocturia, or a significant decrease in urinary stream suggest that urinary retention may follow major

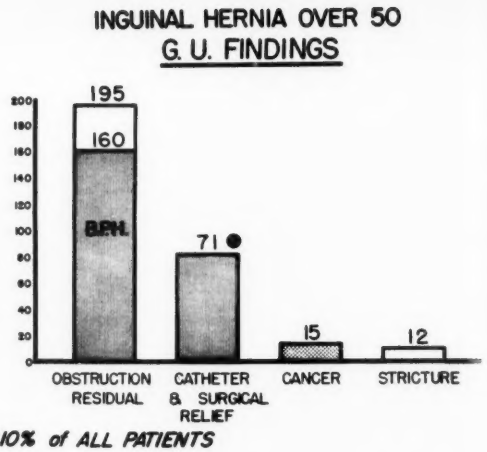


Fig. 2.
The high incidence of urinary obstruction requiring catheter or surgical relief strongly supports the need to evaluate the elderly male before elective surgery is performed.

surgery. In some cases correction of urinary obstruction may take precedence over an elective procedure.

The evaluation of renal function can be kept simple but must be adequate. The determination of blood urea nitrogen alone is not an adequate test of renal function. Although an elevated BUN is seen often in acute surgical conditions this finding prior to elective surgical procedures represents renal failure and will therefore rarely be seen in an otherwise healthy patient. More information can be obtained by the examining of an early morning urine specimen for concentration and the presence or absence of red cells, sugar, and albumin. If urine concentration is less than 1.020 a 12- to 24-hour concentration test should be made. The failure of the patient to concentrate above 1.020 requires the postponement of elective surgical procedures.

### Gastrointestinal Tract

IN THE preoperative evaluation for any surgical procedure care should be given to determining the presence or absence of other diseases. Anorectal disease is so common that routine sigmoidoscopy should be added to rectal examination as a part of a general physical examination.[3] Sigmoidoscopy performed in 1,268 patients in a 10-month period has led to no complications but has demonstrated rectal disease in 16% of these patients. Rectal polyps were noted in 3.2%, and 40 of these polyps as well as four carcinomas were unsuspected before sigmoidoscopy was performed.

Sigmoidoscopy examination should be made simple and convenient to the surgeon if it is to become a part of routine physical examination. A sigmoidoscopy service can readily be estab-



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lished on a central ward in the hospital with savings of time, labor, and instrument damage. Examination can be scheduled as are other simple surgical procedures. When the doctor arrives the patient has been cleansed one-half to one hour earlier by a small (low) enema and is positioned for the examination. This service is a valuable and inexpensive adjunct to a thorough preoperative evaluation.

## Nutrition

THE effect of both malnutrition and obesity is important in an evaluation for major surgery. The surgeon must be weight conscious. Not only the routine admission recording but also a frequent recheck of the patient's weight is important. The weight lost during the first few hospital days when the patient is being "worked-up" will be surprising. Food is usually restricted for x-ray studies and many laboratory tests. Repeated catharsis used in the preparation of the colon for surgery will produce significant dehydration which may be overlooked unless weight is recorded. Finally, in the malnourished patient, it is of relatively little value to order high caloric diets without a follow-up of their ingestion through bedside checks and repeated weight recording.

Knowledge of the so-called "ideal weight" is helpful in rapidly determining the nutritional status of the patient.[4] A basic weight for a male five feet tall is taken as 120 pounds and for a female, 112 pounds. Four pounds are allowed for each additional inch in height. While further allowances can be made for body build, it is safe to assume that a deviation of 10% from this more easily calculated "ideal" is not significant. On the other hand, it cannot be routinely assumed that an obese man is more robust or that the underweight patient will be a good risk because technical difficulties will be decreased. An evaluation of complications following major surgical procedures with relation to weight over a one-year period showed that extremes of weight loss or obesity significantly increase the incidence of complications.

The surgeon readily appreciates the diagnostic and technical difficulties presented by obesity. His labors and the problems of the anesthetist and nurses will be decreased and the patient's convalescence made smoother by the deferral of elective surgery until weight reduction has been achieved. For successful weight reduction instructions must be simple, expectant weight loss reasonable, and an anticipated goal planned for the patient.

Preoperative evaluation of nutritional deficits requires a correlation of the history, physical findings, and carefully selected laboratory studies. Weight loss is a part of many disease processes requiring major surgery. Although protein and blood volume deficits vary according to the nature of the surgical disease, they are related to weight loss. An appreciation of these blood volume deficits is important since weight gain may be impossible to obtain before many major surgical procedures are necessary. An estimation of blood requirements is better made on the basis of weight loss and clinical appraisal than blood hemoglobin and hematocrite levels, but in debilitated patients blood volume determinations with Evans blue dye or radioactive iodinated serum albumin have become an accepted part of the preoperative study.

The necessity of an evaluation of nutritional deficits in all patients who have lost significant weight can be illustrated by the jaundiced patient. There is often a tendency to give only vitamin K plus intravenous feedings before surgery. Since weight gain is impractical through intravenous alimentation[5] more attention should be given to improving the utilization of oral feeding. Recent studies with radioactive fat[6,7] have shown markedly decreased fat absorption in patients with jaundice and pancreatic disease. The addition of bile salts and pancreatic extracts to the commonly ordered high caloric and high protein diet should therefore be considered in the preparation of patients with pancreatic and biliary tract disease.

Blood volume determinations in severely jaundiced patients have shown deficits ranging from 23 to 31% of total blood volume.[8] The failure to replace these deficits before surgery predisposes to surgical shock which is poorly tolerated in these patients. The occurrence of uremia following hypotension and its frequent occurrence when preoperative blood transfusions were not given strongly emphasize the need for preoperative blood volume replacement[9].

## Summary

A REVIEW of postoperative complications suggests the need for closer attention to minor details in preoperative evaluation for major surgery. An adequate evaluation requires an appraisal of the functional and reserve status of the heart, lungs, kidney, and liver plus an overall evaluation of the vigor and nutritional status of the patient. Simple bedside clinical study is more important than complicated laboratory tests. Routine sigmoidoscopy should be considered a part of the general physical examination.

A smoker's cough, markedly decreased vital capacity, failure of the kidneys to concentrate urine, and obesity are contraindications to elective surgical procedures. Cessation of smoking, weight reduction, and correction of urinary obstruction are required. When malnutrition exists gastrointestinal utilization of oral feedings may be improved with bile salts or pancreatic extracts in some patients. Blood volume deficits occur



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with debilitating surgical diseases, and in poor risk patients blood replacement should be guided by blood volume determinations.

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# Major Medical Plans

MORE than 5,000 companies are expected to institute major medical plans this year, compared with only 300 such plans written in 1952. This estimate was made by Philip H. Peters, Vice President, John Hancock Mutual Life Insurance Company, before AMA Insurance Conference in Chicago. The growing interest of companies and unions in plans to protect workers hit by serious illness has led Michael T. Wermel, Research Director of Cal Tech's Benefits and Insurance Research Center, to observe in recent study: "In coming years, it can be expected that this major medical protection will expand materially to accommodate higher medical costs and the expenses coincidental with improved methods of treatment." Employees' need for such protection was underscored in study released earlier this year by Research Council of Economic Security. Reporting that chances are one out of five that an employee will be hit by prolonged illness sometime within next five years, RCES revealed that prolonged illnesses strike over two million employees annually, cost $1.7 billion in productive time lost and $700 million for medical care. Specific trends in major medical plans: comprehensive plans, which combine hospital, surgical and medical benefits in one package. At present, however, most major medical plans are either separate from company's basic medical plans or are, in effect, superimposed upon them. Coverage of smaller-sized employers: Our insurance company during first nine months of 1957, Peters stated, wrote 65% of its new major medical plans on groups involving fewer than 50 people; 84% on fewer than 100 people, 94% on fewer than 250. "Who can say that major medical is a plan for the large organization today?" he asked. Higher over-all maximums: Some major medical plans will pay up to $15,000 in major medical expenses during years an employee is covered. Lower deductibles: Often, employee confronted with major medical expense today need only pay first $50-$100 of expenses before insurance benefits can be applied. Moreover, in negotiated plans, particularly, there appears to be trend toward eliminating the deductible for hospitalization, while retaining this feature as it relates to surgical coverage and to out-patient expenses. Calendar year approach, under which each year employee has to "trigger off" a new deductible, and as his benefits are paid through that calendar year, even if he is out on disability, a further deductible is taking place in the corresponding calendar year. Removal of coinsurance feature: Many plans now have such feature in order to discourage overutilization of a plan. Way it works: insurance company pays, generally, only 75-80% of medical expenses up to maximum policy limits, and employee has to pay rest. Prevailing pressure, particularly in negotiated plans, is for modification or removal of this provision. Automatic reinstatement of insurance after claim has been paid: Presently, many major medical plans call for evidence of insurability after claim has been filed, before claimant can be reinstated. Latest trend, however, is toward allowing automatic reinstatement by substituting satisfaction of specified period of employment for evidence of insurability. Inclusion of psychiatric costs: Trend appears to be in direction of covering many of costs of psychiatric care under major medical plans. Note of caution, though, is sounded by Wermel: "Experience gained under plans currently in operation may point the way toward the need to develop certain cost controls if the inclusion of psychiatric treatment proves to be an expensive item." Is it financially feasible to extend major medical coverage to retired employees? Cost of a soundly-designed post-retirement major medical program should come out to only about one-twelfth as much as a pension program, and no more than that of an after-retirement group life-death benefit program, maintained Peters. Predictions on type of post-retirement major medical programs likely to be adopted by companies in coming years were made by Wermel in his study: "It's likely to be handled as separate plan from that for active employees. Maximum benefits will probably be somewhat scaled down, and various cost control items will also be incorporated in plan.

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From *Industrial Relations News*, December 14, 1957.

# Shielding Device to Protect Gonads During Routine Chest Roentgenography

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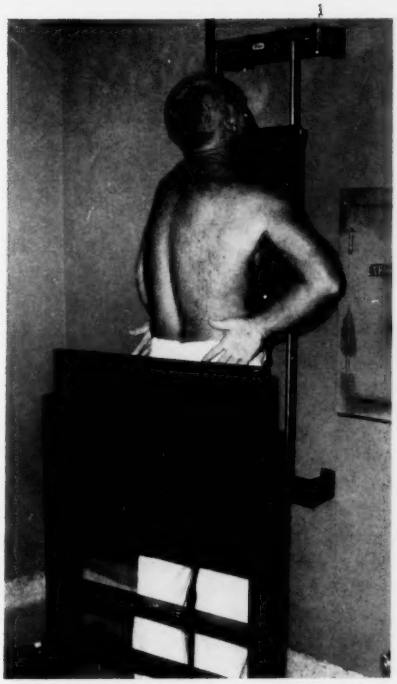
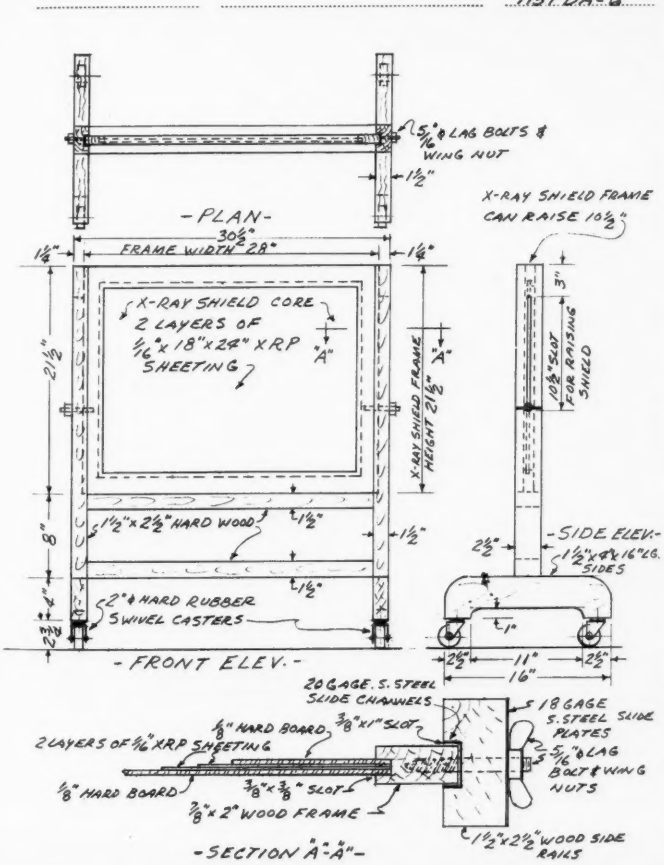
DURING recent months there have been many references, both in medical and in lay literature, concerning the dangers of radiation. There is considerable confusion in the minds of the public as to what constitutes dangerous exposure to medical x-rays. Many physicians also harbor some uncertainty with respect to the details related to this matter. However, there is agreement concerning the increased susceptibility to damage of the gonads by radiation, and exposure of these organs should be avoided or kept to a necessary minimum. This applies particularly to persons of a child-bearing age and under.



During diagnostic or therapeutic medical x-ray procedures, the gonads should be shielded, and such shielding ordinarily offers little difficulty when the x-ray target rests on the x-ray table. Shielding can be accomplished by covering the gonads with lead-lined aprons or small lead sheets which are usually found in all x-ray rooms.

It is somewhat more difficult to shield the gonads during routine chest roentgenography when the patient stands in front of a wall cassette.

The accompanying illustration shows an effective but simple shielding device which will protect both the testes and the ovaries during chest roentgenography. The main body of this shield consists of a sheet of lead 24 in. x 18 in. x 1/16 in. This lead sheet, integrated with laminated fibre board, ordinarily can be obtained from x-ray supply houses. It is secured in the frame in the illustrated shielding device just as a picture might be placed in a frame. The frame can be raised or lowered and fixed in place by means of butterfly nuts. The entire arrangement rests on casters which gives it easy mobility.


BY A.B.G., JR. DATE 8-5-57
CHKD. BY ..... DATE .....
SUBJECT MEDICAL CENTER - PORTABLE X-RAY SHIELD
SHEET NO. 1 OF 1
JOB NO. 1151.DA-6
- PLAN -
FRAME WIDTH 28"
X-RAY SHIELD CORE 2 LAYERS OF 1/16" x 18" x 24" XRP SHEETING
X-RAY SHIELD FRAME HEIGHT 21½"
1½" x 2½" HARD WOOD
2" Ø HARD RUBBER SWIVEL CASTERS
- FRONT ELEV. -
X-RAY SHIELD FRAME CAN RAISE 10½"
10½" SLOT FOR RAISING SHIELD
- SIDE ELEV. -
1½" x 8" x 16" LG. SIDES
20 GAGE S. STEEL SLIDE CHANNELS
18 GAGE S. STEEL SLIDE PLATES
5/16" Ø LAG BOLT & WING NUT
1/8" HARD BOARD
2 LAYERS OF 1/16" XRP SHEETING
3/8" x 1" SLOT
3/8" x 3/8" SLOT
3/8" x 2" WOOD FRAME
1½" x 2½" WOOD SIDE RAILS
- SECTION A"-A" -



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# Industrial Hygiene and Occupational Diseases in Puerto Rico

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Assistant Chief, Preventive Medicine, U.S.A.R.J.

THIS REPORT presents the results of an industrial health survey conducted in the Commonwealth of Puerto Rico in 1955, in 405 industrial plants employing 36,365 workers. This survey provided information concerning available medical facilities; and workmen's compensation laws were reviewed for adequacy and, where inadequate, amendments were proposed.

Puerto Rico is an island in the Caribbean Sea with an area of 3,435 square miles and a population of 2,213,000, an average of 644 persons per square mile. There is a working labor force of 519,000, of which 27.5% are employed in agriculture, 23.5% in transportation, 22.7% in services, 18.3% in manufacturing, and 7.6% in construction and others.

To promote the health and welfare of these half a million workers regarding accidents causing death, or injuries and disease in the course of their employment, the Workmen's Compensation Law of Puerto Rico created in the Department of Labor, a State Insurance Fund and an Industrial Commission. Also by virtue of a reorganization in 1953, a Bureau of Industrial Safety and Accident Prevention was established (Fig. 1).

Some of the functions of the State Insurance Fund are to collect premiums, and to insure that all injured employees covered by the law receive medical assistance, hospitalization, physical rehabilitation, and/or monetary compensation. The Industrial Commission, which is quasi-judicial and quasi-tutelary, adjudicates claims whenever the State Insurance Fund and the injured workman fail to reach an agreement and the matter of compensation thus comes under litigation.

The Health Department shares the responsibility of health maintenance among workers by enforcing sanitary regulations, and issuing health certificates for laborers free of communicable diseases.

The State Insurance Fund reported during the last four years (1950-1954) 248,582 accidents, of which 147,828 developed permanent or temporary disabilities. The Industrial Commission, in the exercise of its functions, intervened in the appeals of 26,930 cases. In 54%, the decisions of the State Insurance Fund were confirmed, and in 28% they were revoked. The majority of the remaining cases were either held over or dropped by the worker (Fig. 2).

In the expenditure of each dollar by the State Insurance Fund, 45.9% on the average is spent in compensation, and 32.6% in medical services. By law 4% is provided from the fund for the operation of the Industrial Commission.

At first glance it would appear from the percentage distribution that the primary objective of the workmen's compensation had been accomplished. However, after analysis, it was found that the incidence of accidents was increasing, and further investigation revealed that no specific amount of money had been allocated for the study and prevention of occupational diseases. It was realized that a readjustment of the dollar percentage distribution was required to effect measures for health promotion and specific protection which would be beneficial to the employee, the employer, and the economy and stability of the state.

To keep abreast of modern living and working conditions, financial settlements and litigation can no longer be considered a sufficient objective in workmen's

From the presentation by the author at the International Conference on the Influence of Living and Working Conditions on Health, Cannes, France, September 27-29, 1957.

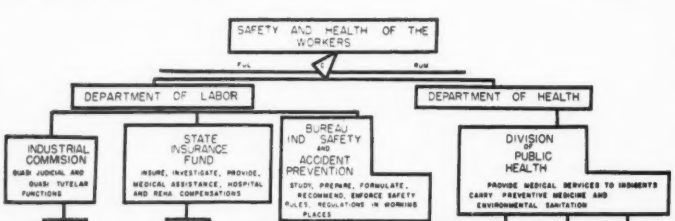


Fig. 1.
Present uncoordinated governmental agencies dealing directly or indirectly with occupational hygiene in the Commonwealth of Puerto Rico.

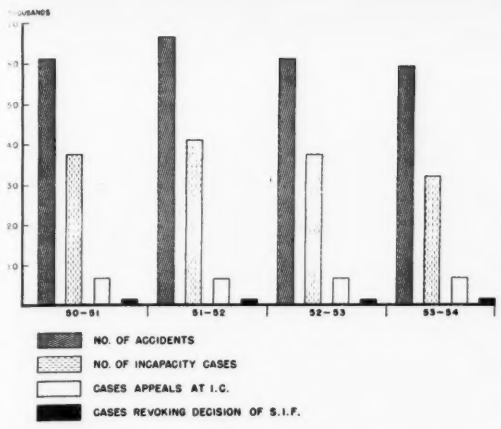


**Fig. 2.**
**Recapitulation of cases of the state insurance (S.I.F.) and the Industrial Commission (I.C.) fiscal years 1950-51 to 1953-54.**

compensation legislation. The prevention and reduction of disabilities through health promotion and specific protection, followed by prompt provision of medical treatment, should be of primary importance in the introduction and enactment of modern compensation legislation and laws. Rehabilitation, even though presented last in the five levels of prevention and treatment of occupational injuries, should be considered primary, and will produce the most promising improvement in accomplishing the ultimate goal of workmen's compensation legislation.

IN REFERENCE to occupational diseases, the statistics available at the time of the survey demonstrate that only 446 occupational disease cases were hospitalized and treated during the period 1951-1954. This amounts to only 0.81% of the total injured workers hospitalized by the State Insurance Fund. These cases, by group category were, 48.6% in agriculture, 31% in construction, 11% in manufacturing industry, 8% in services, and less than 1% in transportation. The medical care and compensation costs were $52,237.25.

Seventy-seven percent of the total number of cases hospitalized were recored as diseases of the skin; 15% were due to systemic effect of poisons, 4% to weather exposure and related conditions; 1.6% to diseases of the eyes; 1.1% to diseases of the respiratory system; 0.8% to diseases of the digestive system;; 0.6% to nervous disturbances, and 0.4% to other and unspecified causes (Table I).

Considering that, at the time of the survey, occupational diseases were not reportable in Puerto Rico and only 20 diseases were included in the Table of Occupational Diseases and their Causes, it is obvious that the present statistics are inadequate and unreliable.

The recent remarkable increase in manufacturing plants in the island has introduced more than 33 new potential health hazards that have not been included in the Table of Occupational Diseases and their causes, and therefore are not compensable (Fig. 3).

Modern industrialization logically demands emphasis on health maintenance and sanitation at places of work. Based on a representative sample of the 36,325 employees covered in the survey, it was found that 4.9% were using common cups, 11.1% were using common towels, and 24.0% had no towels available. Facilities in the 405 plants showed that 45.4% had no separate dressing rooms, and only 3.5% provided privies of any type (Table II).

**TABLE I.**
**COMPARISON OF OCCUPATIONAL DISEASES BY SELECTED CATEGORIES**
**COST OF TREATMENT AND/OR COMPENSATION AS REPORTED TO THE STATE INSURANCE FUND, 1951-1954**

| | Total Number of Cases | %* | Cost in Treatment and/or Compensation | Cost (%) by Selected Category |
|---|---|---|---|---|
| Diseases of the skin | 341 | 77.5 | $36,235.94 | 69.4 |
| Systemic effect of poison | 70 | 15.6 | 11,542.17 | 22.1 |
| Weather exposure and related conditions | 18 | 4.0 | 500.33 | 1.0 |
| Diseases of the eyes | 3 | 0.6 | 344.90 | 0.6 |
| Diseases of central nervous system and peripheral conditions | 3 | 0.6 | 96.67 | 0.2 |
| Diseases of the respiratory system | 5 | 1.1 | 2,872.37 | 5.5 |
| Diseases of the digestive system | 4 | 0.8 | 599.76 | 1.1 |
| Others and unspecified | 2 | 0.4 | 45.11 | 0.1 |
| TOTAL | 446 | 100% | $52,237.25 | 100.0% |

* Percentage distribution by Selected Category.

**TABLE II.**
**RELATED HEALTH PROTECTIVE SERVICES PROVIDED AT THE 405 FACTORIES SURVEYED**

| Item | Factories Number | Factories Percent[1] | Employees Number | Employees Percent[2] |
|---|---|---|---|---|
| Drinking water provided | *405* | *100.0* | *36,325* | *100.0* |
| by fountain | 317 | 78.3 | 32,244 | 88.8 |
| by single cup | 46 | 11.3 | 2,307 | 6.4 |
| by common cup | 42 | 10.4 | 1,774 | 4.9 |
| Shower baths | 269 | 66.4 | 22,574 | 62.1 |
| Wash basins | 377 | 93.1 | 34,555 | 95.1 |
| Hot water for washing | 38 | 9.4 | 6,032 | 16.6 |
| Towels after washing: | *297* | *73.3* | *27,596* | *76.0* |
| common towel | 55 | 13.6 | 4,031 | 11.1 |
| paper towel | 242 | 59.7 | 23,565 | 64.9 |
| Separate dressing room | 241 | 59.5 | 19,843 | 54.6 |
| Clothing lockers | 89 | 22.0 | 9,461 | 26.0 |
| Toilet on premises: | *390* | *96.3* | *35,426* | *97.5* |
| pit privy | 14 | 3.5 | 897 | 2.5 |
| Separate lunch room | 75 | 18.5 | 10,173 | 28.0 |

1. Percentage is based on the 405 factories surveyed.
2. Percentage is based on the 36,325 persons employed in the 405 factories surveyed.



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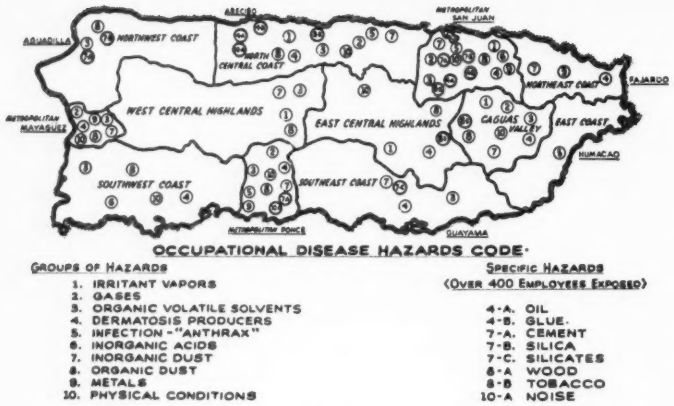


Fig. 3.
Industrial disease hazards found at the 405 factories surveyed, distributed by geographical regions of Puerto Rico.

TABLE III.
MEDICAL AND ALLIED SERVICES
PROVIDED AT THE 405 FACTORIES SURVEYED

| Item | Factories Number | Factories Percent[1] | Employees Number | Employees Percent[2] |
|---|---|---|---|---|
| Physician — full time | 1 | 0.2 | 250 | 0.7 |
| Physician — part time | 20 | 4.9 | 3,714 | 10.2 |
| Nurse — full time | 29 | 7.2 | 6,996 | 19.3 |
| Nurse — part time | 9 | 2.2 | 1,331 | 3.7 |
| Minor surgeon — full time | 1 | 0.2 | 250 | 0.7 |
| Minor surgeon — part time | 2 | 0.5 | 755 | 2.1 |
| Trained first aid worker | 216 | 53.3 | 18,766 | 51.7 |
| Plant dispensary | 44 | 10.9 | 9,669 | 26.6 |
| First aid supplies | 319 | 78.8 | 24,349 | 67.0 |
| Condition of first aid supplies: | | | | |
| good | 87 | 21.5 | 6,340 | 17.5 |
| fair | 149 | 36.8 | 10,423 | 28.6 |
| poor | 74 | 18.3 | 6,401 | 17.6 |
| unknown | 9 | 2.2 | 1,185 | 3.3 |
| Sickness benefits paid | 69 | 17.0 | 8,366 | 23.0 |
| Prepaid medical care plan | 83 | 20.5 | 11,483 | 31.6 |
| Safety director — full time | 0 | — | 0 | — |
| Safety director — part time | 80 | 19.8 | 10,694 | 29.4 |
| Plant safety committee | 24 | 5.9 | 4,032 | 11.1 |

1. Percentage is based on the 405 factories surveyed.
2. Percentage is based on the 36,325 persons employed in the 405 factories surveyed.

The availability of medical services in the manufacturing establishments surveyed indicates that only 5.1% had doctors on a full- or part-time basis.

Nursing and minor surgeons services were provided by 10.1% of the factories, covering 9,302 workers, and there were first aid facilities in 70.2%. Safety directors, employed on a part- or full-time basis were found in only 19.6% (Table III).

Attention is called to Section 6 in the Insular Workmen's Compensation Act which makes mandatory "the provision of a dispensary, a physician, a minor surgeon, or a nurse in plants whose employees exceed 50 in number." This, regardless of whether probable or potential hazards are present in the plant. If the law had been fully enforced, 94% of the employers would have been fined or imprisoned.

THE findings presented here are some of the many outstanding faults that can be noted should one undertake the revision and modernization of workmen's compensation laws. It is realized that troubles result from "marrying in haste and repenting at leisure," however, action has too frequently demanded the slipshod fitting of a borrowed workmen's compensation law to the requirements of a state rather than tailoring one based on local bio-physical principles and social fundamentals present in the interaction of the agent, the host, and the environment.

The Legislature of Puerto Rico, in an effort to keep legal requirements abreast of the basic demands of modern industrialized society, reevaluated its Workmen's Compensation Law in the last Legislative session of 1957. Among the amendments enacted were:

1. Any doubt in the application of the existence of causal relation between the workman's occupation, employer, injury, or occupational character of the illness, shall be decided in favor of the workman.

2. The Act shall be applicable to all employers having one or more employees covered herein, whatever their wages may be.

3. If the disability is of a temporary or transitory nature, the compensation will be 60% of the wages the disabled received or would have received on the date of the accident.

4. Whenever the worker's disability extends for 10 or more days, the employee shall be paid the amount corresponding to the three days waiting period.

In addition to the 16 new diseases added to the former Table of Occupational Diseases and their Causes, compensable occupational diseases shall be considered to be diseases acquired in the course of work as a consequence of a risk peculiar to the particular industrial process, occupation, or employment.

# *Eleventh International* Congress on Dermatology

## WITH REFERENCE TO OCCUPATIONAL DERMATOSES

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Philadelphia

THE ELEVENTH International Congress of Dermatology was held in Stockholm July 31-August 6, 1957. The total registration of active members was about 1200; of associate members (members and family of active members), about 600. Fifty different nations were represented among the registrants.

In contrast to the Tenth International Congress, London, 1952 (*Indust. Med. & Surg.*, 21:10, 502 (October) 1952), discussion of occupational dermatoses was conspicuous. This subject was one of six main themes on the program. It comprised 35 papers at three different sessions. In addition, there were two sessions devoted to discussion of detergents and barrier creams. This comprised 19 papers.

The authors of these 54 presentations represented 20 different nations. Members of the Industrial Medical Association on the program were D. J. Birmingham, R. R. Suskind, and J. V. Klauder, (members of the IMA Committee on Dermatology).

The papers on occupational dermatoses concerned actual causes, incidence, diagnosis, preventive measures, and dermatologic hazards of a number of occupations. Still other aspects were prognosis, complicating factors, and emotional reactions. It is beyond the scope of this report to review all of these papers; only a few will be discussed.

As a cause of nonoccupational sensitization dermatitis, nickel stands high as a causal agent. The skin of a considerable number of persons is in frequent contact with nickel through nickel-plated articles of clothing (zippers, garters, suspenders), through jewelry (earrings, necklaces, wrist watch straps), through a variety of instruments (scissors) and other appliances (paper clips). In the paper by Marcussen (Copenhagen) he attributed this exposure as a possible explanation of the increasing incidence of nickel sensitization dermatitis of industrial workers. The implication of his paper is that industrial workers exposed to nickel should avoid the aforementioned sources of exposure. His paper is of legal significance concerning proof of source of nickel sensitization.

In the paper on "Dermatoses Due to Rubber," by Pirilä (Helsinki) it was stated that about 1000 different chemicals are employed in making rubber and that the end result of this combination may be different from the original components. He listed 29 accelerators and 11 antioxidants that exert allergenic action. An important aspect of sensitization dermatitis to rubber is occurrence of dermatitis through cross sensitization and also resulting from exposure to the allergen present in material other than rubber. Thiuram sulfides are one of the allergens causing sensitization dermatitis to rubber. Some soaps (including a well-known one sold in the United States), antiseptic skin sprays, scabicides and fungistatic compounds may contain tetramethyl thiuram disulfide. He cited a patient with sensitization dermatitis to rubber who had severe cutaneous reaction from ingestion of (a well-known) preparation containing tetramethyl thiuram disulfide that is used to wean alcoholics from alcohol.

Of the antibiotics, penicillin and streptomycin are highly allergenic. Sensitization dermatitis from this source is encountered not only among hospital personnel, but also among pharmaceutical employees. In Huriez's paper (later discussed) mention was made of an orderly so highly sensitized to streptomycin that he had recurrence of dermatitis from handling a bed pan used by a patient being treated with streptomycin.

Another relatively new hazard of pharmaceutical workers is stilboestrol. Katzenellenbogen (Jerusalem) reported 19 employees (including some children) engaged in the manufacture or handling of stilboestrol who presented the following symptoms: Male adults had tingling of the nipples, tenderness of the breast, nodules under the nipple area, and later gyaecomastia, decreased libido, and later impotence. The children had dark pigmentation of the linea alba, pigmented nipples, and, in more pronounced cases, pigmentation of the scrotum and approximal part of the penis. Children were more susceptible to stilboestrol than adults. Hyperpigmentation of the linea alba was of diagnostic



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import. The urine of affected adults showed considerable increase of total estrogens.

In Malten's (Netherlands) study of dermatitis among workers in a calico-printing factory, patch tests were performed with 100 different substances. The most frequent causes of sensitization dermatitis were Ice-Red color TR-base, a few closely allied chemicals, especially Rapidogen-yellow-14 G. The use of a chlorine solution for hand cleansing seemed to facilitate sensitization; barrier creams were not effective in its prevention. A few instances of "hardening" were observed.

Vickers (Sheffield, England) reported study of 250 cases of dermatitis in the steel industry. In 34% of these the cause was directly attributable to the treatment of a trivial injury. *Verbum sat sapienti* Vicker's paper had considerable practical application concerning the avoidance of injudicious and overtreatment of a cutaneous injury, and the avoidance of irritating and sensitizing medicaments, including injection of penicillin.

Two papers were presented on moniliases of occupational origin. Infection with this yeast-like fungus — Candida albicans of occupational origin is presented as paronychia or as a shiny red patch with a collarette of scales (erosio interdigitalis blastomycetica) occurring usually in the webs between the fingers. Wet work, inherent to many occupations, predisposes to this infection, and also exposure to syrupy fluids among workers canning fruit. Paronychia may also be of bacillary origin from maceration inherent to wet work. Whether mycotic or bacillary, the infection is a prolonged one, resistant to treatment and incapacitating if many fingers are involved.

In 60% of cases of paronychia studied by Feilchenfeld (Tel-Aviv) the following fungi were cultured: Candida albicans, 50%; Aspergillus niger, 40%; other fungus or two species, 10%. It was not possible to prove whether the recovered fungus was primary or secondary (species of Aspergillus are notable contaminants). The high incidence of Candida albicans infection in the foregoing study suggests the local use of gentian violet in treatment of paronychia. This medicament is of particular value in this yeast infection, and would also be of value if the infection is bacillary.

Hübschmann's (Prague) report concerned Candida albicans infection in goose pluckers and in those engaged in fruit canning and in milk canning.

The report of Huriez (Lille, France) was comprehensive and expansive. He discussed a considerable number of causes inherent to many industries. In addition, he presented statistics of the incidence of occupational dermatoses among one and a half million workers in the highly industrialized region of Lille. In his analysis 20 industries were represented, with the percentage of workers in each industry, and the incidence of dermatoses per 10,000 workers in each.

The industries employing the most workers were textile, metal working, and mining. The incidence of dermatoses in these groups ranged from 1.16 to 2.88 per 10,000. In contrast to this rate, it was 12 in the building industry (attributed to cement), and 9.6 in the chemical industry. These were the highest incidences in his study.

According to Huriez the incidence of occupational dermatoses is increasing. Its incidence in all workers is 1%; it comprises 50% of all occupational diseases; 10% of all cutaneous affections; one-third of all exogenous eczema (contact dermatitis). Chemicals as causal agents are increasing either as primary irritants or allergens. Allergic dermatitis comprises one-half of all occupational dermatoses (this cause was 15.2% in my study, *J.A.M.A.*, 160:442, 1956). In the chemical industry important causal agents are plastics and synthetic resins, formol, aliphatic and benzene by-products, textile dyes, stiffenings, solvents, and diluting products, synthetic rubber components. The "mineral oil pathology" (I presume the meaning is oil folliculitis) is affecting numerous industries — metallurgic, motor-car, mining, textile. Among drugs are antibiotics, cocaine salts, chlorpromazine, and alkaloids. In agricultural industry are infections including mycotic and parasitic, fertilizers, insecticides, and weed killers.

**(1934 Spruce Street.)**

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## Conditions of Employment

IT IS especially important that the physician accept positions in industry only where he is assured of proper status within the industrial organization. He must have direct access to top management and be assured that his recommendations will receive thoughtful and considerate attention. His medical and legal responsibilities alone make recognized status essential. The physician's position in the company is an indication to workers of the degree of importance management places on their health.

—From "Industrial Medicine, A New Specialty," by W. P. SHEPARD, M.D., abstr. in *Current Med. Dig.*, December, 1957.

# Medical Department Layout and Design

## Section II — Editing a Proposed Plan

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WE WILL now be called on to edit the proposed layout plan for a Medical Department that will serve a NEW factory.

Information essential to planning a layout was listed under six headings in Section I. The information relevant to the plan we are about to edit, is as follows:

1. NUMBER OF PERSONS TO BE SERVED:

The maximum number of persons working at any one time, will be four thousand (4,000) classified as follows:

| | Hourly | Salary | Total | |
|---|---|---|---|---|
| Men | 2,800 | 540 | 3,340 | Men |
| Women | 500 | 160 | 660 | Women |
| Total | 3,300 | 700 | 4,000 | Total |

Employment schedule calls for:
First Three Months — 60% — 2,400 employees
Second Three Months — 40% — 1,600 employees
End of Sixth Month — 100% — 4,000 employees

2. NUMBER OF SHIFTS, AND NUMBER WORKING ON EACH SHIFT:

Management contemplates a ONE-SHIFT operation, on a five-day, 40-hour week. Thirty-minute lunch periods are staggered over a midday hour.

There is always the possibility that production schedules may necessitate a second, or even a third shift operation. Regardless of the number of shifts, all Examination Functions, and the preponderance of clerical, stenographic, secretarial, and administrative activities will be confined to the first, or day, shift. It must be borne in mind, that a factory employing this many people, be it operating or idle, will have from 50 to 150 maintenance personnel of all descriptions, on the premises, "around the clock."

3. THE SCOPE AND TYPE OF MEDICAL SERVICES TO BE RENDERED:

The department is to provide ALL medical services. No detached auxiliary first aid or redressing stations are contemplated.

The scope and type of medical services correspond to those which were sufficiently well outlined in Section I (*Indust. Med. & Surg.*, 27:1, 1 (January) 1958).

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This is the second of the four sections in which DR. FULTON is presenting his subject. The third will appear in the March issue.

4. THE CHARACTER OF THE OCCUPATION:

This is a MANUFACTURING occupation. There is an occasional operation that could be called heavy, however, the jobs performed in this factory are classified as MEDIUM MANUFACTURING INDUSTRY.

5. GENERAL LAYOUT OF BUILDINGS AND WORKING AREA:

The factory is an almost square, two-story structure, the manufacturing area on the two floors amounting to 1,750,000 square feet. A projecting two-story structure fronts the central third of the factory, and houses the administrative offices, cafeteria, the Employment, Personnel, Medical, Safety, and Plant Protection Departments, and some of the employees' locker rooms. There are 62,000 square feet in this projection.

These contiguous buildings are on a fenced 30-acre tract, on which are sundry walks, roadways, and small buildings, a powerhouse, and the parking lots.

At least 95% of the employees work within the factory and administration buildings. The others are distributed among various activities, scattered within the fenced tract.

The Medical Department is on the ground floor of the administration building, corresponding to the first floor level of the factory, and fronts to the outside on the main highway. One end abuts the Personnel and Employment Department; the other end forms the wall of a corridor between hospital and employees' locker rooms that passes from factory to outside exit. The back is part of the front wall of the factory. The main entrance from the factory into the hospital pierces this wall near the central point. This entrance is near the geographical front-center of the plant population.

6. THE POLICIES OF MANAGEMENT:

The principles, objectives, and ethics pertaining to the practice of Occupational Medicine, as recommended and approved by the Industrial Medical Association and the Council on Industrial Health of the American Medical Association, embrace, and are, the accepted policy of management in this instance.

Briefly, this policy entails:

(a) Full professional responsibility for the



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care, treatment, and prevention of all occupational injuries and diseases.

(b) Care of all personal injury or sickness during working hours, in accordance with the ethics governing the relationships between the occupational and the private practitioners.

(c) Application of the principles of preventive medicine to the maintenance of health, through the early detection of incipient disease, individual health education, and insistent referral for corrective measures.

(d) In-plant responsibilities that would ordinarily be those of a Public Health Officer charged with protecting and promoting the health of the people in a community.

(e) Responsibility of good professional citizenship in the community cooperating with all agencies, public and private, whose aim is to protect and improve the physical, mental, and environmental hygiene of individuals or groups.

WE HAVE now ascertained the facts, objectives and policies regarding this project. Before beginning to plan or to edit a proposed plan, our next step should be formulation of some idea of the number and character of the *daily* jobs to be performed, when work begins. One must admit that possession of this type of information will sharpen imagination and foresight, and increase immeasurably the ability to plan or to edit.

In this instance, management has furnished us the four facts that are sufficient to serve as a basis for forecasting what the character and number of our daily jobs will be. The four facts are: (1) Five-Day, 40-Hour Week; (2) An Employment Schedule; (3) A Manufacturing Occupation; and (4) Maximum Employment — 4,000.

1. On a five-day, 40-hour week schedule (allowing for legal holidays) there are 21 working days in each month.

2. The employment schedule calls for hiring 2,400 employees in the first three months, which, on a five-day week, would contain 63 working days. Sixteen hundred employees are to be hired in the succeeding three months. The average daily number of Pre-employment Examinations necessary to meet this schedule is as follows:

FUNCTION 1-A. PRE-EMPLOYMENT EXAMINATION

| | Examinations Per Day | Working Days | Total Examinations | Management's Schedule |
|---|---|---|---|---|
| First Three Months | 41 | 63 | 2,583 | 2,400 |
| Second Three Months | 28 | 63 | 1,764 | 1,600 |
| Total — Six Months | | 126 | 4,347 | 4,000 |

This schedule does not appear formidable; in fact, when the discussion of the special features of this particular function in the preceding section is recalled, it appears a little too pat. Note that we plan to examine 4,347 applicants in the first six months; the maximum quota being 4,000, the 347 represent an 8.6% surplus. The effect of the local labor turnover or quit rate will make its appearance shortly after any group of people begin work. The surplus here, amounting to 1.5% per month, is necessary to maintain employment at the desired levels, and to allow for rejects and those who fail to accept employment. With this 8.6% allowance, the examination schedule presented above is still too pat. One must keep in mind the sudden ups and downs, and the pressure demands for increased numbers of Pre-employment Examinations — a characteristic feature of this function. This is especially true in manufacturing industry. Therefore, when planning a Medical Department, remember the two following axioms, fostered by the past experience of others:

(a) If a projected hiring schedule indicates a definite required number of Pre-employment Examinations per day, design your Examination Facilities to turn out twice that number. (In this case, 41 per day is required; hence, design facilities with a daily capacity of 82.)

(b) Examination Facilities should be capable of producing a daily number of examinations equivalent to 2% of the maximum number of employees. (In this case, the maximum number is 4,000 — 2% of which is 80.)

FUNCTION 1-B:

There is little likelihood that PERIODIC, OCCUPATIONAL AND HEALTH MAINTENANCE EXAMINATIONS will be required in the first six months. While there may be an occasional exception, Periodic Examinations of foodhandlers and those employees engaged in known hazardous occupations, are usually done on a yearly schedule.

FUNCTION 1-C. SPECIAL CONSULTATIONS:

Some of these cases will require services in the Examination Facilities. A few will be encountered in the second month, and they will increase in number from then on in proportion to the number of people at work.

At this point, we conclude that for this project, the EXAMINATION FACILITIES SHOULD BE DESIGNED TO COMPLETE 80 PHYSICAL EXAMINATIONS PER DAY.

TREATMENT FUNCTIONS:

3. A MANUFACTURING industry.

4. Maximum employment 4,000.

These two facts may be considered together. The following statement, made in Section I, applies here: "For purposes of planning, the ratio 1:15 may be used with confidence as a predictor of the daily average number of Treatment Function cases a given number of people in a MANUFACTURING occupation will produce."

In this instance, we have 4,000 employees en-

gaged in a MANUFACTURING occupation.

4,000 ÷ 15 = 266 — average daily load of cases classified as Treatment Functions (direct services).

In Table XII, this ratio is applied to the number of people working at the end of each of the first six months. This gives a fairly accurate preview of the progressive buildup in the number of Treatment Function cases, as the number of employees increases. Adding the hiring schedule and other potential examination procedures, furnishes a picture of what the average daily case load will eventually be.

TABLE XII.
AVERAGE DAILY CASE LOAD — ALL FUNCTIONS

| At the End of the | Examination Functions 1-B | 1-C | Hiring Schedule 1-A | Number of Employees Working | Treatment Functions 2-A & 2-B Ratio 1:15 | Total Average Number Contacts Per Day |
|---|---|---|---|---|---|---|
| FIRST | 0 | 0 | 41 | 800 | 54 | 95 |
| SECOND | 0 | ? | 41 | 1600 | 106 | 147 |
| THIRD | 0 | 1 | 41 | 2400 | 160 | 202 |
| FOURTH | 0 | 2 | 28 | 2940 | 196 | 226 |
| FIFTH | 0 | 3 | 28 | 3470 | 231 | 262 |
| SIXTH | 0 | 4 | 28 | 4000 | 266 | 298 |

As indicated across the bottom line of Table XII, we may anticipate an average daily load of 266 Treatment Function cases, once our maximum employment of 4,000 is reached.

Table II compared the demands for types of medical service between manufacturing and *non*-manufacturing occupations. Pertaining specifically to manufacturing occupations, the following general conclusions were laid down.

| GROUP "A" Percent of Total | | Progressive Totals Percent | |
|---|---|---|---|
| 34% | New Injuries | 34% | |
| 20% | Retreatment — Injury | 54% | Total Traumatic |
| 39% | Sick Complaints | 93% | Total Treatment Functions |
| 7% | Examinations | 100% | |
| 100% | | | |

According to this, our 266 Treatment Function cases make up 93% of all cases.

1% = 266 ÷ 93 = 2.86021. Applying this 1% factor to Group "A" above, yields the daily case load in numbers of the various types of services, as set forth in Group "B."

| GROUP "B" Percent of Total | Types of Cases | Number of Cases | Progressive Totals Cases | Percent |
|---|---|---|---|---|
| 34% | New Injuries | 97 | 97 | 34% |
| 20% | Retreatment — Injury | 57 | 154 | 54% |
| 39% | Sick Complaints | 112 | 266 | 93% |
| | Total Treatment Function Cases | | 266 | 93% |
| 7% | Examinations | 20 | 286 | 100% |
| | Total Cases | | 286 | 100% |

To meet the relatively frequent demands for great numbers of Pre-employment Examinations, we have already decided to plan Examination Facilities capable of turning out 80 per day. Day-to-day variation in the number of Treatment Function cases is nowhere near as drastic; however, some allowance for variation must be made. The 266 cases yielded through application of the 1:15 ratio, represent the "ANNUAL daily or shift average" number of Treatment Function cases produced by 4,000 people in a manufacturing occupation. As indicated in the discussion of the data in Table VII, there are frequent daily variations 30% above the annual average, and some rare instances that may be as high as 60% above. Therefore, DESIGN TREATMENT FACILITIES TO SERVE A DAILY NUMBER OF CASES 30% IN EXCESS OF THE ANNUAL AVERAGE EXPECTANCY. In this instance, our daily expectancy is the 266 cases. Thirty percent of 266 is 80. WE MUST PLAN OUR TREATMENT FACILITIES TO SERVE 266 PLUS 80, A TOTAL OF 346 TREATMENT FUNCTION CASES PER DAY.

Adding 30% to each of the three types of Treatment Function services, as set down in Group "B," yields Table XIII.

Since the basic functional floor layout is not affected, there is no point here in reducing the number of sick complaints and new injuries of Table XIII to quantitative percentages of sick complaints, types of injury, and body parts involved. Such information would influence the quantity and type of materials, drugs, instruments, and equipment to be used and installed. If desired for this purpose, the necessary in-

TABLE XIII.
MANUFACTURING OCCUPATION DAILY CASE LOAD TO BE PLANNED FOR — ALL FUNCTIONS IN OPERATION: 4,000 EMPLOYEES WORKING

| Types of Cases | 1:15 Annual Group "B" | 30% of Group "B" | Total Cases | Progressive Total |
|---|---|---|---|---|
| New Injuries | 97 | 29 | 126 | 126 |
| Retreatment-Injury | 57 | 17 | 74 | 200 |
| Sick Complaints | 112 | 34 | 146 | 346 |
| TOTAL TREATMENT FUNCTION CASES= | 266 | 80 | | 346 |
| | | EXAMINATIONS | | 20 |
| | | | | 366 |



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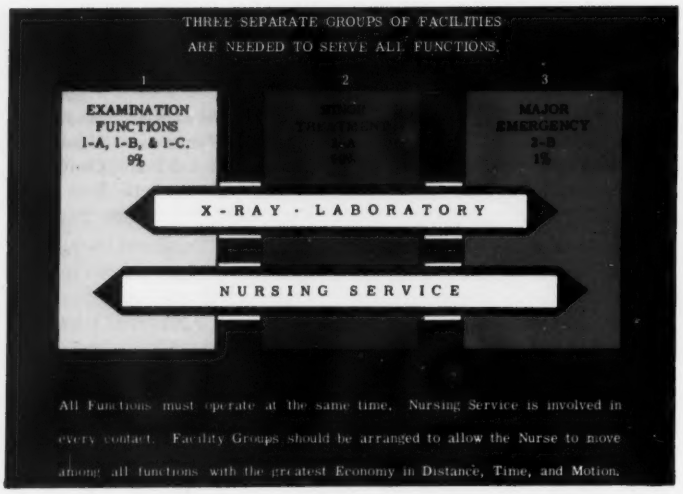
THREE SEPARATE GROUPS OF FACILITIES
ARE NEEDED TO SERVE ALL FUNCTIONS.
1
2
3
EXAMINATION FUNCTIONS
1-A, 1-B, & 1-C.
9%
MAJOR EMERGENCY
2-B
1%
X-RAY · LABORATORY
NURSING SERVICE
All Functions must operate at the same time. Nursing Service is involved in every contact. Facility Groups should be arranged to allow the Nurse to move among all functions with the greatest Economy in Distance, Time, and Motion.

Fig. 1.

formation may be obtained by applying the percentages contained in Tables VIII and IX to the number of new injuries and sick complaints contained in Table XIII.

Table XIII sets down the numbers of the respective types of individual cases that we will be called on to attend, per day, after the hiring schedule is completed, employment is stabilized at 4,000, and *all* functions classified in Section I are in routine operation.

The next step is to visualize the flow pattern of these 366 cases through the "Three Separate Groups of Facilities" that we concluded were "needed to serve all functions," as graphically represented in Fig. 1.

The following percentages and numbers of our 366 cases will have need of the respective facility groups, as follows:

| Facility Group (Fig. I) | Cases per Day: Percent of Total Cases | Cases per Day: Number of Cases Table XIII |
|---|---|---|
| 1. *Yellow* Examination Functions 1-A, 1-B, & 1-C | 9% | 33 |
| 2. *Green* Minor Treatment 2-A | 90% | 329 |
| 3. *Red* Major Emergency 2-B | 1% | 4 |
| Total Daily Cases | 100% | 366 |

What may appear to be a discrepancy should be explained at this point. We refer to assigning 7% as the proportion of examinations both in Table II and in the foregoing groups of Figs. A and B, while 9% has just been used, and is the assigned proportion of all cases using the Examination Facilities in Fig. 1. In the first instance, 7% deals with those persons who enter the hospital for the express purpose of undergoing a Pre-employment, Occupational, or Health Maintenance Examination. These are the SCHEDULED examinations. In the second instance, while the 9% includes the 7%, the 2% difference represents those who come or are brought to the Department primarily because of a minor or major injury or illness, and for whom procedures such as x-ray or laboratory tests are indicated, which necessitate entrance into the Examination Facilities. These are the *NON-*SCHEDULED Examination Functions that, in most cases, use more than one facility group. They are classified as Function 1-C.

We are now in a position to take the three steps necessary to arrive at a final condensed summary of our anticipated daily task.

STEP I:

Distribute the 366 daily cases according to the percentages appearing in the FLOW PATTERN THROUGH MEDICAL FACILITIES.

STEP II:

TIME RHYTHM OF FLOW. Taking into consideration the midday lunch hour, medical service for an eight-hour working day, must cover a span of nine hours (540 minutes). Divide the respective numbers of cases, as described in Step I, into the 540 minute time-span. The results will form a reliable concept of the time rhythm or time rate of entrance of patients into the Department and thence into the various facilities.

STEP III:

As suggested in the Flow Pattern, apply the studies of TIME SPENT IN HOSPITAL in Tables X and XI to the numbers of cases as distributed in Step I. This gives a general concept of the amount of time patients will remain within the various TREATMENT facilities.

Applying these three steps yields the data combined in Table XIV, and represents the DAILY FLOW CHART OF MEDICAL SERVICES through the Department we are called on to plan.

The data relative to the TOTAL TREATMENT FUNCTIONS in Table XIV will give rise to perhaps the most impressive first observation. Three hundred and thirty-three cases will enter our Department during the day, at an average time interval rate of ONE CASE EVERY MINUTE AND 37 SECONDS! Treatment Facilities must be planned to accommodate this daily case load.

Patients do not enter riding at fixed intervals on a conveyor belt. The onset event of illness and

TABLE XIV.
DAILY FLOW CHART OF MEDICAL SERVICES

| | Step 1 9 Hours of Service (540 Minutes) Number of Cases | | Step 2 Time Rhythm One Case Every: Hours | Minutes | Minutes | Step 3 Time Spent in Hospital Average Minutes Per Case Table X | Table XI |
|---|---|---|---|---|---|---|---|
| II - MINOR TREATMENT FACILITIES | | | | | | | |
| Function 2-A | | | | | | | |
| a. 52% Minor Treatment Area | 190 | | | 2.84 | | | |
| b. 18% Eye Rooms | 66 | | | 8.18 | | | |
| 70% | | 256 | | | 2.10 | 10.5 | 13.4 |
| c. 15% Physiotherapy | 55 | | | 9.81 | | 24.3 | 37.2 |
| d. 5% Rest - Recovery | 18 | | | 30.00 | | 45.0 | 48.2 |
| 20% | | 73 | | | 7.40 | | |
| 90% Total | | 329 | | | 1.64 | 16.7 | 25.3 |
| III - MAJOR EMERGENCY FACILITIES | | | | | | | |
| Function 2-B | | | | | | | |
| 1% Emergency Facilities | 4 | 4 | 2 | 15.00 | | 51.0 | 60.0 |
| TOTAL TREATMENT FUNCTIONS | | 333 | One Case Every Minute and 37 Seconds | | | 17.53 | 26.93 |
| I - EXAMINATION FACILITES | | | | | | | |
| Functions 1-A, 1-B & 1-C | | | | | | | |
| 7% Scheduled | 25 | | | 21.60 | | Approximate | |
| 2% Not Scheduled | 8 | | 1 | 7.50 | | 26 : 30 | |
| 9% | | 33 | | | 16.36 | | |
| TOTAL ALL FUNCTIONS | | 366 | One Case Every Minute and 28 Seconds | | | | |

injury obeys no time schedule. The four emergency cases per day, so neatly scheduled at intervals of two hours and 15 minutes, rarely happen that way. All four have been known to be brought in during a single 30-minute period. Some days there are none, other days as many as 10. Be sure of one thing, however; treatment cases will enter at shorter intervals than the average "minute and 37 seconds." The midday lunch hour is included in the 540-minute day, on which this average is based. The fact that extremely few employees choose the lunch hour for a hospital visit automatically shortens this average time interval. It is superfluous to point out that on the days having fewer cases, the interval will be longer. These are added reasons to those already given in this section and in Section I, for planning Treatment Facilities to accommodate a daily number of cases 30% in excess of the annual average daily expectancy.

Regardless of incidental variations, the type of information that appears in Table XIV is a valuable prerequisite to planning from scratch or to the edit of a proposed plan, be the project small or large. The brief time needed to obtain it is time well spent.

The following inferences are drawn when the contents of Table XIV are applied to our specific project:

2. MINOR TREATMENT FACILITIES:

(a) *Minor Treatment Area:*

FOUR CLOSELY GROUPED TREATMENT STATIONS, BOOTHS, OR SMALL ROOMS, WILL BE NEEDED IN THIS AREA.

*Reasoning:* 190 cases at the rate of one every 2.84 minutes, remaining in the hospital an average of from 10.5 to 13.4 minutes. Four times 2.84 = 11.36. This is less than 13.4 minutes, but is, however, the approximate mean between 10.5 and 13.4 minutes. More than half of these cases average only 5.8 to 7.8 minutes, as noted in Tables X and XI — Time Group 1. Therefore, four Treatment units will be ample to serve this case load.

(b) *Eye Rooms:*

TWO EYE ROOMS WILL BE NEEDED.

*Reasoning:* 66 cases at the rate of one every 8.18 minutes, remaining from 10.5 to 13.4 minutes. Because of the narrow margin in this time range, one unit would be inadequate, despite the fact that half of these cases average only 5.8 to 7.8 minutes. Especially in the care of eye conditions, there must be sufficient time between cases to insure the meticulous perform-

ance of measures to prevent contagion and cross-infection. Two units are needed.

(c) *Physiotherapy:*

FOUR PRIVATE SPACES WILL BE NEEDED.

(Two of these should permit accommodation of prone patients.)

*Reasoning:* 55 cases at intervals of 9.81 minutes, remaining from 24.3 to 37.2 minutes. Four times 9.81 equals 39.24 minutes. As 39.24 is well above the high average of 37.2 minutes, four spaces will be ample. Most of the many types of physiotherapeutic equipment are mobile, and can be moved into and out of the four spaces.

(d) *Rest — Recovery:*

THREE PRIVATE BED SPACES WILL BE NEEDED.

*Reasoning:* 18 cases at 30-minute intervals, remaining from 45 to 48.2 minutes. Three times 30 equals 90, and 90 minutes is almost double the high average of 48.2. If conditions were always average, two spaces would suffice. The time interval between patients requiring rest and recovery, however, is erratic, and the "bunching" of two to four cases within one hour is fairly frequent. Epidemic sickness among so many as 4,000 will at times increase the need for these facilities. At least three spaces should be provided to meet these circumstances.

3. MAJOR EMERGENCY FACILITIES:

AN OPERATING ROOM AND TWO BED SPACES WILL BE NEEDED.

Emergency cases are subject to the same erratic time intervals and tendencies to "bunching" that were cited in the instance immediately preceding. Two well-equipped bed spaces should be provided. There may be times when one of the bed spaces, provided for rest and recovery, will be needed for a third emergency case. Because of this possibility, the room for rest and recovery should be near the acute Emergency Facility. One operating room is enough.

1. EXAMINATION FACILITIES:

We have already decided to provide space to accommodate more than the 33 cases per day, at intervals of 16.36 minutes.

These 33 visitors to the Examination Facilities form 9% of all the daily visits. "The Flow Pattern Through Medical Facilities," divides this 9% into proportions of three types of Examination Functions, as follows:

6.0% — 1-A. — Pre-employment - Placement Examinations
1.5% — 1-B. — Periodic, Occupational, and Health Maintenance Examinations
1.5% — 1-B. — Special Consultation Examinations

9%

These proportions were based on the combined records of factories in widespread geographical locations, represent a general average, and would not necessarily hold true in the location we have under consideration. It was also pointed out in Section I that there are a number of factors which influence the demands for numbers of Pre-employment Examinations (Function 1-A). Considering the geographical location of our project, the QUIT RATE is a most important factor. A study of the records of well over 100 plants, scattered over the length and breadth of these United States, discloses a variation in the *annual* quit rate (accumulative) of from 2.4% to 125.0% of the respective plant populations. The quit rates of the total number of plants studied averaged 20.0%. It is, therefore, obvious that the proportionate percentages of the respective three classifications of Examination Functions, 1-A, 1-B, and 1-C, will be tremendously influenced by the "going quit rate" in the locale of any project. Since we have already decided upon the size and determined the adequacy of the Examination Facilities in our project, the question may be raised, "what has all this to do with functional layout planning?" The answer is "nothing." However, since the local quit rate has a drastic effect on the pattern of work to be performed by the physician, observations regarding this effect should be recorded here.

Let us assume that a physician is considering full-time employment in our project. If he has knowledge of the local quit rate in compatible occupations, the physician can determine, with a fair degree of accuracy, the *fixed* number of Pre-employment Examinations he will be obliged to perform in order to maintain employment at the level of 4,000.

IN THE geographical area of our project, the quit rate for similar occupations is 45.5%, an approximate average of 3.8% per month.

To illustrate the effect on the physician's services, let us place the four quit rates mentioned, in their numerical order, as follows:

| Annual Accumulated Quit Rate | | Pre-Employment Examinations Required to Maintain Employment at Level of 4,000 | | | |
|---|---|---|---|---|---|
| | | Year | Per Month | Per Week | Per Day |
| 1. Low | 2.4% | 96 | 8 | 1.8 | .4 |
| 2. Average | 20.0% | 800 | 66 | 15.4 | 3.1 |
| 3. OUR PROJECT | 45.5% | 1,820 | 152 | 35.0 | 7.0 |
| 4. High | 125.0% | 5,000 | 416 | 96.1 | 19.6 |

Though serving identical numbers and occupations, the work pattern of the physicians located in these four geographical areas will be far from identical. It requires no unusual imagination to grasp that fact, after a 30-second perusal of the above figures.

In outlining the MEDICAL STAFF INVOLVEMENT in Section I it was pointed out that the PHYSICIAN is directly involved in all Examination Functions

and all Major Emergencies. "He will *not* be involved in *more* than 10% of the Minor Treatment Function contacts."

Neither quit rates nor location will influence the rate of TREATMENT FUNCTION visits, and hence these four Departments face an identical potential of 333 Treatment Function cases per day. The potential involvement of PHYSICIAN services is likewise identical in these four locations; namely, in FOUR EMERGENCY cases and as many as 33 (not more than 10% of the 329 daily Minor Treatment visits) MINOR TREATMENT visits, per day.

The numbers of Pre-employment Examinations necessary to maintain employment at the 4,000 level, as they appear in the data above, are based solely on the quit rate, and were referred to as "FIXED NUMBER." We mean by "fixed" the rock-bottom MINIMUM number required, assuming that there are *no* refusals to accept employment, *no* rejections, *no* discharges, and a full 255 working days. Practical experience teaches that the actual number of examinations done turns out to be approximately one-third higher than the number "fixed" by the quit rate. At the end of the year, the Pre-employment Examination rates in these four localities will probably appear as follows:

| Pre-Employment Examination Rates — One Year | | Number of Pre-Employment Examinations Done | | | |
|---|---|---|---|---|---|
| | Percent of 4,000 Employees | Total Year | Average Per Month | Average Per Week | Average Per Day |
| 1. Low | 5.6% | 255 | 19 | 5 | 1 |
| 2. Average | 25.5% | 1,020 | 85 | 20 | 4 |
| 3. OUR PROJECT | 57.3% | 2,295 | 191 | 45 | 9 |
| 4. High | 165.7% | 6,630 | 552 | 130 | 26 |

These figures are confined to Function 1-A alone, and to them must be added the number of persons "engaged in occupations known to be hazardous," and the number of foodhandlers. Classified within Function 1-B, these represent the periodic OCCUPATIONAL Examinations. Combining them with the number in Function 1-A, makes up the total number of examinations that MUST BE DONE FIRST. Periodic HEALTH MAINTENANCE (balance of Function 1-B) and SPECIAL CONSULTATION Examinations (Function 1-C), from a practical viewpoint are secondary, and take a "back seat" to this "come first" group.

Our project contains 163 persons engaged in occupations potentially hazardous to health, and 45 foodhandlers, a total of 208. Adding these to the 1-A's will increase the average daily examination load by approximately *one* examination, in all four locations.

Assuming that the four Departments have the same number of PHYSICIAN HOURS available each day, what effect will the respective labor turnover rates have upon the character and pattern of work performed by the physician? Keep the above figures in mind, and remember that in all four localities the physician faces the same Treatment Function potential.

In areas reflecting a quit-rate from the No. 1 LOW through the No. 2 AVERAGE turnover rates as they appear above, the fixed average load of from two to five examinations per day does not appear formidable. Of course, there will be days when from five to 12 "must" examinations will be necessary. Nevertheless, and in spite of the number of TREATMENT cases to be served, in areas where labor turnover rates are low there are proportionately more physician-hours available with which to reap the long term profits from activities devoted to health maintenance, safety, and preventive medicine. In quantity, the physician-hours that can be devoted to such activities will be in inverse proportion to the increase in the labor turnover rate.

Areas with labor turnover rates similar to that of Our Project (line 3), (quit-rate 45.5%, labor turnover 57.3%) are "borderline," when it comes to the physician-hours that are available for preventive activities. The work pattern of physicians serving industry in these areas, on a month-to-month basis, will closely resemble the one indicated by the objective data in Table V (Section I). In discussing Table V it was pointed out that there was a "decrease in the relative number of Occupational and Health Maintenance Examinations in months when the percentage of Pre-employment Examinations shows an increase." Opportunities for preventive activities will present themselves to physicians in these areas, at irregular intervals.

As we advance from No. 3 into areas with rates as indicated in No. 4, physician-hours available for preventive work dwindle progressively from a trickle to nil. The available physician-hours in the No. 4 locality face an average of 27 "must" examinations per day, to maintain par. There will be many days with higher demands. Compare No. 4 with the respective two, five, and 10 daily examinations required in the other three localities. Have no doubt that quit rates of 125% and labor turnover rates of 165.7% exist. They do! I have served a group that within one year required 339 pre-employment examinations to maintain an average enrollment of 182 employees. This is a labor turnover rate of 186%. We are bound to agree that in volume and character no two jobs would be alike among four physicians each of whom served the same number of people in these respective localities. Regions with low to average quit rates are rife with opportunities for the profitable and constructive practices of preventive medicine. As medical service extends into regions having high-



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er quit rates, the opportunities for preventive work fade progressively to the point where physician-hours are totally monopolized by placement examinations and the *treatment* of occupational injury and disease. This latter phase of industrial practice is sometimes referred to as "negative," "compensation," or "finger-wrapping" medicine. The former phase, embodying the principles of preventive medicine, is sometimes referred to as "positive," "constructive," or "preventive" medicine.

In regions of high turnover rates, regardless of the number of physician-hours that may be available, there is another factor that serves as a road block to the effective application of the principles of preventive medicine. That factor is the "average duration of individual employment." While the physical environment of a factory remains fairly stationary, the people who work in it do not always stay put. Should our project be located in the No. 4 region, it is a safe guess that not more than 700 out of our original 4000 would still be with us at the end of the fifth year. High turnover reduces the opportunity for individual follow-up, advisory, and corrective measures so drastically that much of the medical time, effort, and material expended turns out to have been sheer waste. Much more could be said, but it is unnecessary to elaborate further on this point.

Sufficient evidence has been presented to demonstrate that the quit rate has an important influence upon the character and administration of medical services to people at work. It is also a qualifying factor in determining what constitutes *adequate manning* of a Medical Department under these various circumstances. (The principles and methods of determining manpower adequate to operate occupational Medical Departments are not relevant to the present subject of architectural layout planning, and will be left for discussion in another section.)

At the outset of this particular discussion we confessed that the quit rate had nothing to do with functional layout planning. As we have seen, however, it does have a profound effect on the work pattern of the physician. Therefore, these observations should be clearly recorded here to serve as a planning guide to aid those physicians who contemplate the practice of occupational medicine. There are all sorts of physicians who have all sorts and degrees of special interests. To illustrate our point, we will choose two physicians whose interests are widely divergent.

TYPE 1. INTEREST CENTERED CHIEFLY IN THE PRACTICE OF CURATIVE AND REPARATIVE MEDICINE AND SURGERY.

While quite proficient in these phases of practice, this type of physician shows little, if any, interest in preventive medicine, public health, or the humanities, and in some instances professes to have "no use for statistics." I have heard this type characterized as "treat-'em doctors."

(a) Will function best and derive optimum "job satisfaction" when located in an area where the labor turnover rate is high. In this environment most, if not all, of his available time will be absorbed in those phases of practice that command his chief interests.

(b) Place this type of physician in areas of low turnover, with time in excess of that absorbed by his chief interests left on his hands, and he will be bored. (Unless he is just plain lazy.) In addition, the opportunity to administer *other phases* of occupational practice will be lost, because of his lack of interest and, perhaps, aptitude along those lines. With this lost opportunity goes the potential profit in health, safety, and economy that would accrue to the benefit of the industry as a whole and to the employees as individual people.

TYPE 2. ACTIVE INTEREST IN THE BROAD CONCEPT OF OCCUPATIONAL HEALTH AND SAFETY.

Average interest and skill in the practice of medicine and surgery.

(a) Will function to best advantage in areas where labor turnover rates are low, and time is available for the administration of a well-rounded Occupational HEALTH program.

(b) Place this type of physician in a situation where a high labor turnover brings about the monopoly of his time by placement examinations and treatment, and he will be frustrated. His incentive will be dulled, his sense of achievement unfulfilled, his "job satisfaction" sadly bent.

Suppose these two physicians were actually placed in their respective "b" environments? I think we can agree that it would be a tremendous advantage to the physicians, to the industries, and to all employees concerned, if they switched jobs. Perhaps knowledge of the local quit rate prior to employment might have served as the tool to prevent such a *faux pas* of selective placement? We believe that prior knowledge would serve as a positive aid to optimum placement, and suggest that physicians entering the field of occupational medicine avail themselves of such knowledge and make use of it. That such knowledge can be an effective guide in work planning, has been amply demonstrated.

A list of sources from which information regarding local quit rates may be obtained would include the following:

Employment Bureaus, Federal, State, and Civic.

Personnel, Employment, Industrial Relations Associations and Agencies.

Chambers of Commerce.

Manufacturers Associations.

Companies having branch offices or factories in the locality.

Some of these sources have this information

classified into types of occupation and geographical areas.

Knowing the number of people to be served and having ascertained the local quit rate specific to the type of occupation he is considering, it is a simple matter for the physician to put this information to good use. He need only apply the same reasoning and simple methods to his quit rate as were just applied to the 45.5% quit-rate of our project, which produced the No. 3 line in the last two groups of figures. The result of the physician's application will be the approximate number of Pre-employment Examinations he will be required to do in order to maintain average employment. The physician also by applying the method outlined in the previous portion of this section can calculate the approximate number of Treatment cases he will be called on to attend. Placing the two numbers together will produce a fairly accurate preview of the character of medical services he will be obliged to perform. Not only will such an assay help the physician to plan his work with foresight, it will also be an important factor in determining if his particular interests, talents, and aptitudes are best suited to this assignment. Use of the foregoing methods of appraisal will at least furnish the physician the wherewithal with which to look before he leaps.

This completes the analysis of the job our Medical Department will undertake. We have applied the contents of Section I to the six-point prospectus presented to us by management at the beginning of Section II. The summation of this analysis, as set forth in Table XIV (Flow Chart of Medical Services) together with the discussion thereof, will go a long way toward creating in the minds of architects, physicians, and industrial nurses, a reliable bird's-eye view of the activities that will take place in this Department. There will result a sharper ability to visualize the time, motion, traffic, and volume involved in giving and receiving services in the various facilities; a clearer concept of exactly what must be planned for.

Had this project been a non-manufacturing occupation (white-collar), we would have reached our conclusions by way of identical reasoning and method. The number of Treatment Function cases would be obtained by the use of the 1:50 ratio, as described and exemplified in Section I. The percentages of the various types of cases would be the same as those that appear in the right-hand column of Table II. The actual figures, as they would be were our project serving a *non*-manufacturing occupation, will be added as an appendix at the end of this section.

We have visualized the activities that will take place in our project and by specifying Examination Facilities that are more than ample, and Treatment Facilities that are capable of handling 30% *more* than the number of cases that would normally be expected, we have anticipated *heavy case loads* and provided for them. To be kept in mind, and of equal importance, are the questions pertaining to the adaptability of these facilities to the three circumstances that follow:

1. REDUCTION IN FORCE:

Suppose the number of employees were reduced to 1000 and all functions were in operation. (There would be an inevitable reduction in the number of Medical Staff personnel.)

Will the same facilities function with the same efficiency?

What will the effect be on the time, the motion, and the effort required of the medical personnel?

2. NIGHT SHIFT:

Three hundred to 500 people working. Treatment Functions *only*. ONE NURSE on duty.

Will the arrangement of the Treatment Facilities permit ONE nurse to control and operate the Department with a minimum of time, motion, and physical effort?

3. CIVILIAN DISASTER (at war or during peace):

Are these facilities adaptable to quick conversion for service to people in the exigencies of civilian defense or disaster?

Can reasonably adequate "workshops" be provided for the use of outside first aid, medical, and surgical teams?

WE HAVE traveled a long way in building this foundation for layout planning. Considerable territory in the *administrative* realm of occupational medicine has been covered. Whether all of the effort expended in planning-to-plan has been worthwhile is yet to be seen.

Management is presenting a proposed plan to us for our comment, suggestions, and opinion. This is not a hypothetical layout created to serve the purposes of this discussion. It is the authentic plan designed by an architect specifically for our project. The start of construction is subject to our edit and final approval. As we review it, many of its features and its faults will be recognized as existing in Departments you have visited or perhaps in your own.

The PROPOSED PLAN is presented in Fig. 2.

This proposed plan is pleasing to the eye and appears well-balanced. Before subjecting it to functional dissection, observations of a general nature are in order.

1. The almost square shape, and the location in relation to the Employment Department and factory, are both good features. The 4,875 square feet provide an area that is ample to contain all the facilities that we have decided were necessary.

2. Two corridors cross this Department. They are six feet wide (113 linear feet x 6 = 678 square feet). A four-foot width is sufficient for corridors in this type of Department. A full-



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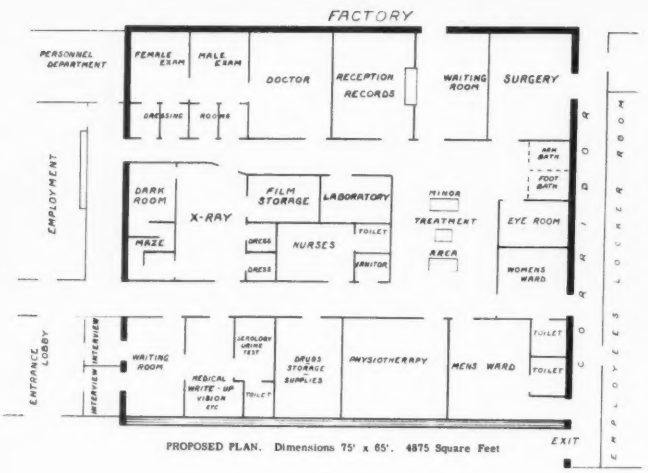


**Fig. 2.**

sized hospital bed can be wheeled through a four-foot corridor with a good 10 inches to spare. Turns into rooms can be made without difficulty, provided the architect has designed and placed doorways to meet this contingency.

3. The two doorways into the X-Ray room are so placed as to form a most convenient and unique "through-way." Rest assured that it will be made use of, to the intermittent frustration of the X-Ray technician and embarrassment of the resident patient. Indeed, unless it is so used, physician and staff will be forced to walk through the Minor Treatment area in order to pass from side to side within this Department.

There is another reason why such a convenient passageway through the X-Ray facilities should not be allowed to exist. This reason is neatly summarized in the following (INS) news item, dated July 23, 1957, and captioned *WATCH THAT X-RAY*. "Americans are getting almost half of present radiation safety limits from medical and dental X-Rays alone, according to a survey being prepared for the National Academy of Sciences." We can assume that X-Ray technicians are behind protective barriers when "buttons are pushed." Medical staff members are not in the habit of wearing lead-lined clothing. There are too many chances in this arrangement for one of them to barge in, any number of times, at the instant the "button is pushed." In the interest of safety, such a potentially harmful exposure should be avoided.

4. In the left lower corner a waiting room for the Pre-employment Examinees is provided. Entrance to this waiting room is gained through two interviewing booths that open into the Employment Department. There is another opening that connects this waiting room with the Department corridor. An additional large doorway opens directly into this same corridor from the Employment Department. This Pre-employment suite and the entrances thereto are far removed from the reception desk situated at the main entrance from the factory. In discussing the source of medical contacts (Section I) it was pointed out that 6% to 8% originate in the Employment and Personnel Departments, and, hence, only 6% to 8% would have need of this remote entrance. Unless this number is *consistently* high enough to justify placing a medical staff member full-time in this area, the *remoteness* of this entrance could create a nuisance. In our project, the daily number of examinations required during the *first six months* would unquestionably call for one or more medical personnel to be stationed in this area full-time (41 and 28 per day — see Schedule Function 1-A). When maximum employment is reached, and work levels off, our project will require only seven or nine Pre-employment Examinations per day, as indicated by line 3 in the two groups of figures on pages 90 and 91. Such small numbers would not justify full-time manning of this post. What if there were a reduction in force to 1,000? Certainly we have shown that the numbers of required Pre-employment Examinations are anything but consistent, varying between 1.5% and 19.9% within a 12-month period (see Table V). This irregularity of Function 1-A, interspersed with days when there are very few Pre-employment Examinations, can create quite a problem when the entrance from the Employment Department is at such a long distance from the center of medical activity. (From 92 to 94% of all medical contacts originate in the working areas, and come into the hospital through the main "factory" entrance.)

Unless a member of the personnel or medical staff travels the distance necessary to escort the OCCASIONAL Pre-employment candidate into the Medical Facilities, he or she will wander into and about the hospital promiscuously, usually winding up in the middle of the Minor Treatment area. Such events will become a chronic interrupting and demoralizing nuisance to medical personnel. Not even a good signaling system would alter the distance that would have to be covered. Architecture can, however, shorten this distance and prevent the nuisance.

5. Isolating Pre-employment candidates from contact with other medical activities is an excellent feature in this proposed layout. It is a desirable feature in all layouts. As the late Dr. Wishard pointed out, mixing the two, especially

on days when both accidents and hiring are heavy, is apt to form the "impression on the candidate that this must be a bloody place to work." The desirable feature of isolation can be retained in a location that lends itself to a more consistent control of Pre-employment traffic under all circumstances.

6. Passing clockwise from the left lower corner around the perimeter, eight doorways into the Medical Department are noted. There should, of course, be entrances adequate for efficient operation and safe evacuation in case of fire or explosion. From the viewpoint of security, especially in defense industries, every opening in the Medical Department must be considered a potential avenue for sabotage and espionage. The presence of so many as eight entrances into a Department of this size could be a factor in the creation of traffic control problems.

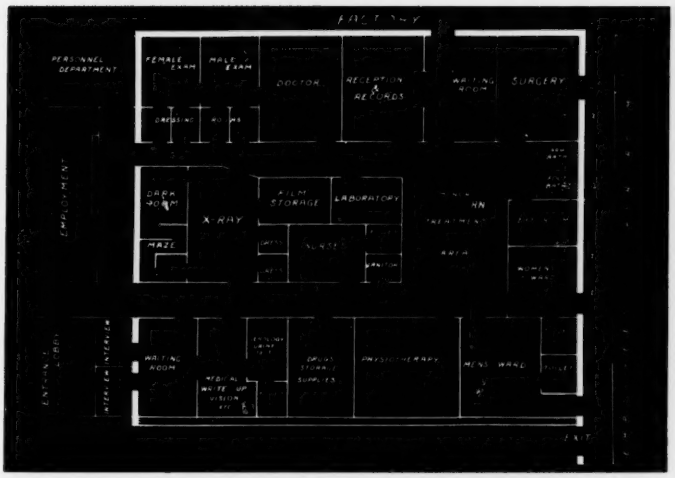


Fig. 3.

7. *Traffic Control.* Better to analyze traffic flow, in Fig. 3 we have indicated in blue the potential pathways that are possibly but not probably used by *patients*. Of all visitors having real business in the Medical Department, 94% will enter and exit through the doorway marked "FACTORY," the other 6% will use either of the two pathways leading to the Employment and Personnel Departments. There is no question about these three pathways being used.

Regardless of the traffic of those having legitimate business, corridors such as these are an architectural invitation to the rank and file to make a thoroughfare of the hospital. It is amazing how many people will go out of their way to take advantage of such an opportunity, some out of morbid curiosity, others simply thoughtless. The majority of these transients will be members of the clerical and supervisory force. Physician or nurse reviewing the pattern projected here may look forward with confidence to a continuous two-way parade from Personnel Department to factory, and from factory back to Employment Department. This parade will pass right through the busiest area, namely, where Minor Treatment is being dispensed. It is next to impossible for the medical staff to control this type of traffic without creating ill will. A lone nurse on third shift duty would have a rather hectic time operating or controlling this Department, unless all doorways, other than the main factory entrance, were effectively secured on *both sides*.

Aside from the disagreeable inconveniences of poorly controlled traffic, such a situation is BAD MEDICINE. Promiscuous uncontrolled traffic through any Medical Department greatly increases the danger of contamination of the materials and instruments used in the care of the sick and injured.

Note the letters "RN" placed in the Minor Treatment Area, near the entrance into the eye room. RN indicates the center or point of greatest nursing activity. There are two reasons for the choice of this location in the proposed plan.

1. Section I: Flow Pattern Through Medical Facilities:

90% of all contacts use these Facilities.
52% Cared for in Minor Treatment Area.
18% Cared for in Eye Treatment Facilities.
70%

2. Section II. Table XIV — Daily Flow Chart of Medical Services. ( Through *our* project.)

90% = 329 Total *daily* Minor Treatment Contacts.
52% = 190 Minor Treatment Area.
18% = 66 Eye Rooms.
70% = 256 Contacts. One case every 2.10 minutes.

These reasons should be sufficient for assuming that in a layout such as this, RN would prove to be the point of greatest nursing activity. RN will designate this specific point in all plans that follow.

GENERAL observations disposed of, we are now ready to subject this plan to functional dissection. That group of facilities designed to handle the Examination Functions is the first function for discussion.

1. EXAMINATION FUNCTIONS:

The sources and pathways of the three types of examination functions are indicated in YELLOW in Fig. 4.



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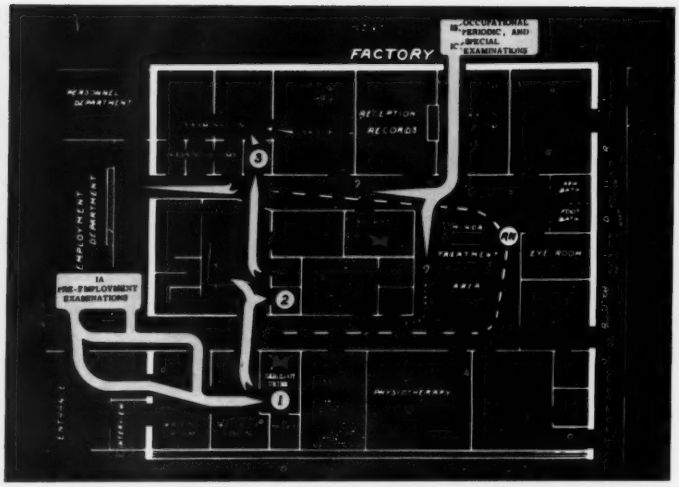


Fig. 4.

FUNCTION 1-A — PRE-EMPLOYMENT:

Tracing the course of the candidate from the Employment Department, note that after the medical write-up and vision test, we have numbered three distinct stopping places.

1. A partial disrobing is necessary here for serology. The urine specimen is obtained, after which the patient must cross a corridor to reach the X-Ray room.

2. X-Ray Dressing Room. Disrobing is necessary. When X-Ray is completed, the patient must dress again, and cross another corridor (dressed, undressed, or gowned) to reach one of the:

3. Dressing Rooms in the Examination Suite. More dressing and undressing will be necessary. When examination is completed, the patient returns to the Personnel Department by way of the upper corridor.

Each of these three stops entails a dressing operation that can consume much time and cause some unnecessary inconveniences to the patient. The two corridors that must be crossed are not exactly PRIVATE.

There is just space enough in these dressing rooms to contain one person comfortably, provided he remains in an upright position. Flexion in any direction, without careful deliberation, may result in multiple contusions. A *relaxed* sitting posture is out of the question. These dressing rooms are small enough to stimulate any tendency toward claustrophobia, and too small to serve *any other useful purpose.*

The speed with which numbers of Examinations are performed will be governed by the pace set at point 1. There is one toilet and space to do one serology at a time at this point. Two dressing rooms at point 2 and four at point 3 will have little effect on the processing rate at point 1.

With the exception of the one just mentioned, toilet facilities at other locations in the Examination Facilities or in the doctor's office, are conspicuously *absent.*

FUNCTION 1-B — PERIODIC, OCCUPATIONAL, AND HEALTH MAINTENANCE,

and

FUNCTION 1-C — SPECIAL CONSULTATIONS:

Both of these come into the Department through the FACTORY entrance, and can be considered together.

The split pathways ending in questionmarks, indicate optional routes to the Examination Facilities, one of which must pass through the Minor Treatment area unless the X-Ray room is used as a through-way.

Function 1-C. Special Consultations make their initial stop in the doctor's office. If "technical diagnostic procedures over and above what can be performed by the physician in his office" are required, the patient will be directed into the Examination Facilities. It was further pointed out, in discussing this Function (Section I), that some of these cases "require some temporary care or medication, such as a throat to be mopped, a boil opened, or a dressing to be changed. Facilities and equipment to meet such contingencies should be reasonably close at hand." In the proposed plan, no such facility or equipment is shown in the doctor's office. Hence, doctor and/or nurse must accompany the patient over the required distance into the Treatment areas where such equipment and materials are located.

R.N. is the point of greatest nursing activity. The broken yellow lines radiating from this point indicate the routes to the Examination Facilities. Under any and all circumstances, R.N. is the location where a nurse or nurses are most likely to be working. Some form of "Nursing Service is involved in every contact" (Fig. 1). It is customary for a nurse to accompany all females undergoing examination or treatment. In this layout, the distances from R.N. to the Examination Facilities appear quite long. A great many steps will be required of the nurse to reach the Examination Facilities and doctor's office when the need for her services in these locations becomes OCCASIONAL.

The odd-shaped RED symbol that looks like a nondescript undershirt hanging on the clothes line at stopping point 1 is duplicated in the LABORATORY to call attention to the circuitous routes between these two locations. Whether one journeys between the location where specimens are obtained at point 1 and the Laboratory by

way of the Minor Treatment area or through the X-Ray room, the distances covered are the same. If the Laboratory technician collects as well as analyzes specimens and the need to collect at point 1 is OCCASIONAL (say, one every 15 to 20 minutes), the distance could become a fatiguing chore.

In discussing the Special Facilities (Section I) we noted that "Especially in groups of medium size (500 to 3,000) *one person* may serve as both X-Ray and Laboratory technician. For this reason, it will prove an advantage to place the Laboratory *adjacent* to the X-Ray room." The arrangement in the proposed plan would not prove convenient to the person performing both assignments.

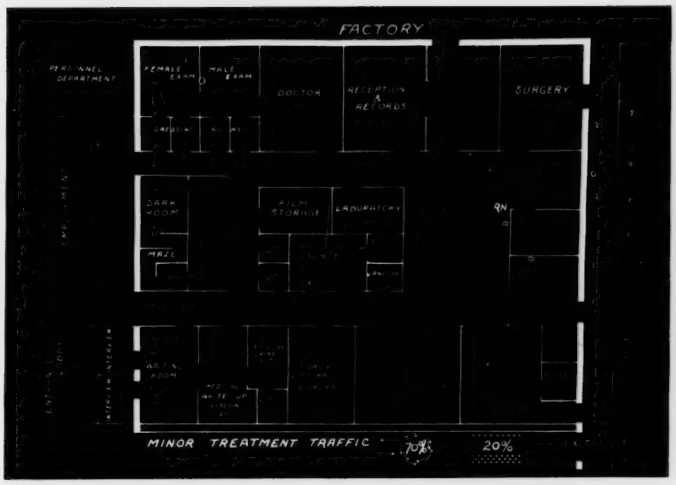


Fig. 5.

We question whether examination suites exclusive to men and to women are justified or necessary. Six hundred and sixty, or 16½%, of our 4,000 employees will be women. Examination Facilities can be so designed as to permit a degree of *individual* privacy that will obviate the consideration of sex.

The location of the doctor's office, in relation to the Examining Facilities, is ideal. The major portion of his time is usually devoted to the Examination Functions. The Examination suites, X-Ray and Laboratory are convenient to him, and the medical record room is adjacent. We see no provision for a secretary. Service to 4,000 people will more than justify employment of a full-time secretary. In manufacturing occupations, 4,000 employees will create more cases than one full-time physician can attend efficiently. In this Department, the physician will be intermittently involved in up to 33 Minor Treatment and four or more Emergency cases per day, in addition to the Examination Functions. It will become evident that his proximity to these Treatment Facilities and the center of nursing activity is an important factor in the time and motion of both physician and nurse.

FUNCTION 2-A — MINOR TREATMENT:

In Fig. 5, GREEN indicates the Minor Treatment Facilities and the areas through which these patients move. The detailed breakdown of this classification into types of cases and their distribution among the facilities is set forth in Table XIV. Minor Treatment cases make up 90% of the total hospital contacts. Our project must care for 329 cases per day at the rate of one case *every minute and 38 seconds*. In Fig. 5 we have divided these cases into two groups:

GROUP I — 70%.

Consists of 256 cases that will be cared for in the Minor Treatment area and Eye Room. While these numerous cases are of short stay in the hospital, averaging only 10.5 to 13.4 minutes per case, a very high part of the in-hospital time will require *direct* nursing service, and hence the greatest portion of nursing time will be consumed by these cases. *ARROWS* INDICATE THE PATHWAYS OF THE PATIENTS IN THIS GROUP. As the whirligig pattern of arrows indicates, these short-term cases will be literally all over the place. Some will require X-Ray, and this facility is none too convenient to the Minor Treatment area and to the center of nursing activity.

GROUP II — 20%:

Consists of 73 cases that will be cared for in the arm and foot bath, physiotherapy room, and wards. While these cases will average a much longer stay in the hospital, the direct nursing time per case is no more, and probably less, than the time required in the short-stay cases. Little nursing time is needed to accompany a patient to the physiotherapy quarters, adjust the apparatus, and set the automatic timer. Constant attendance on such cases is unnecessary, nor do nurses remain at bedside throughout periods of rest and recovery. LINES OF *DOTS* INDICATE THE PATHWAYS OF THE PATIENTS IN THIS GROUP. Note that these less numerous cases must pass through the busy Treatment area in going to or from the physiotherapy room and the wards. The arm and foot baths are in a good functional location.

The pattern formed by ARROWS and DOTS bears visual witness that the Minor Treatment area is a vortex of activity. Pathways of patients and profession crisscross in every direction. Add the transient traffic of those who use the Medical Department as a thoroughfare and this area will



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Fig. 6.

become a whirlpool of confusion. Rare days when treatment cases are exceptionally high, such as the 499 and 588 case-days recorded at the bottom of Table VII, will create pandemonium. The doctor must travel into this area to attend those who need his services. He must traverse this busy area to reach wards or physiotherapy room.

The Minor Treatment activity is permeated with a myriad of physical complaints and symptoms — coughs, colds, fevers, infections galore. Is it good surgical practice to care for open wounds in such an environment? Secondary infection is an arch enemy of any form of surgery. The best defense has and always will be methods and techniques which render materials, instruments, and surroundings germ free. We cannot afford to let our guard down. Contemporary miracle drugs may not always prove a reliable crutch to bolster poor technique. From a practical viewpoint, one does not expect the meticulous procedures of a major surgical operation to be carried out in a general dispensary. The potentialities for contagion and secondary infection in this layout are, however, sufficient to cause the father of aseptic surgery (Sir Joseph Lister) to shiver in his shroud.

Minor Treatment areas and facilities with features similar to those we have just described are fairly common in industry. Quite a few have been constructed during the past decade and others are in the process of construction in these "modern" times. For lack of a better descriptive term, we define such layouts as *wide-open dispensaries*. The photograph tracing (Fig. 6) is a factual portrayal of a wide-open dispensary.

This photograph was made in a splendidly equipped "modern" industrial Medical Department. It is selected for tracing because the area shown is similar in size, shape, and arrangement to the corresponding Minor Treatment area in our proposed plan. Should our proposed layout be adopted you can be sure that the scene depicted will be continuously reenacted at all hours during any *average* case-load day in our quarters.

The camera spots 13 persons in this area. Three registered nurses, a microtherm technician, a physician, and eight patients are identified. A number of problems and probable difficulties can be visualized:

1. Freedom of movement among the treatment stations.
2. Aseptic technique.
3. Traffic control.
4. Stretcher transportation through this area.

It is not unusual to have a patient faint while undergoing treatment. Chair, table, and supplies often crash with the victim. These episodes in such a wide-open area create a demoralizing spectacle for other patients.

The continuous enactment of scenes such as this pay little deference to the PRIVACY and DIGNITY OF THE INDIVIDUAL. Here are eight employees of both sexes undergoing various treatments. All are in plain view and within easy earshot of each other! In such an environment only a moron is apt to confide (?) in the nurse. Architecture without some privacy will rob the nurse of many opportunities to discover human relation problems. Lack of reasonable privacy in a plant dispensary is as much out of place as it would be in the office of a private physician.

FUNCTION 2-B — EMERGENCY:

In Fig. 7, the *RED* ARROWS indicate the pathways involved in this Function.

Practically all cases require transportation. By making use of the corridor, the architect has provided separate entrances for them. This is a good feature, and one to be desired in all layouts. Carrying stretchers through main entrances, waiting rooms, and busy Treatment areas should be avoided whenever possible. It must be borne in mind that ambulatory patients with minor complaints can become Emergency cases after reaching the hospital. Therefore, transportation *to* the Emergency Facilities *from* any point within the Department may be necessary.

The corridor doorway nearest to the factory enters the surgery. The principles of asepsis, which should be rigidly maintained in this room, will be violated if indiscriminate entrance by nonprofessional personnel is permitted. An operating room is rarely, if ever, the first stopping point for an injured person. First aid, treatment of shock, evaluation of the condition, and other preoperative procedures usually come first. We

have already decided that the Major Emergency facilities should consist of an *Operating Room* and *"two well-equipped bed spaces."* (Point 3, page 90.) The "two-bed" room, hereafter called the EMERGENCY or ACUTE WARD, should be designed specifically for the initial and subsequent care of injuries and illnesses that require transportation and are broadly defined as "acute" or "emergency." This facility should be the FIRST STOPPING POINT for these cases.

Since no such facility appears in the proposed plan, the stretcher bearers are faced with three optional far-apart entrances into the Department from this corridor: the surgery, women's wards and men's wards. Remembering sex identification under emergency circumstances can be confusing to stretcher bearers, they may get their signals crossed in choosing the door that matches the sex of their patient. A former question comes up again. Is it necessary to provide wards that are *exclusive* to men and to women? We can assume that these two wards will be occupied most of the time by patients with non-acute conditions who are undergoing rest and recovery, or perhaps simple therapies, such as infrared ray treatment (see point "d," page 90). We question whether this is the best environment into which to bring, or in which to treat, seriously injured or ill patients.

Note that the men's ward is located on the *daylight side* of the Department. Acutely ill and injured people little appreciate the presence of sunshine. They fare best in quiet, shade-drawn, darkened or semi-darkened rooms. Providing the wards with toilet facilities is a good feature.

The entrances into the wards from the hospital and corridor are far removed from surgery. When it becomes necessary to carry a patient between these locations, the long journey must be made through the public corridor or the Minor Treatment area. Should X-Ray studies be required, a two-way journey through the busy Treatment center is unavoidable. Most fracture cases require two trips to X-Ray: diagnostic and after reduction.

This plan shows ready access to an exit that will be convenient for ambulance transportation. It is a good feature.

There should be a room for autoclave and sterilizer, in which dressings, instruments, and certain other surgical supplies can be prepared, sterilized, and stored. No such facility is indicated on this plan. There is insufficient additional space in the surgery to contain such a room, and

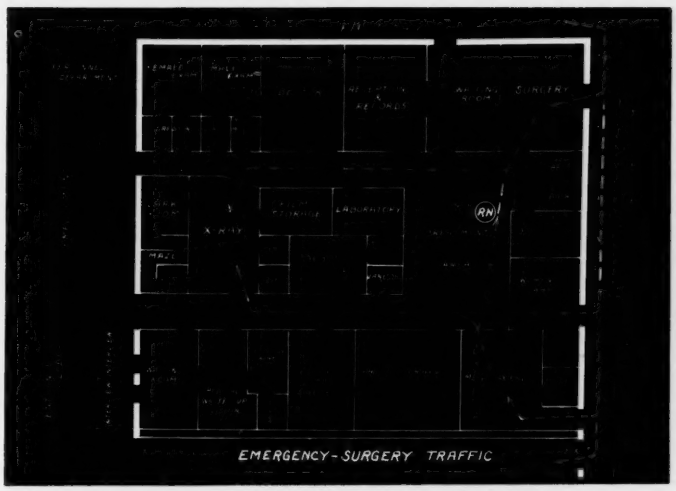


Fig. 7.

I think we can agree that the operating room is no place for such activity and storage. This leaves the room captioned DRUGS-STORAGE-SUPPLIES, as the possible location of an activity that is a very IMPORTANT AND HIGHLY SPECIALIZED PROFESSIONAL RESPONSIBILITY. As the name implies, this room contains items that can range from laundry, towels, soap, bed-linen, crutches, splints, and canes to sterile ampules and blood plasma. This is not a fitting environment in which to carry on such a highly specialized activity.

Regardless of where sterile supplies are stored, one fact stands out like a sore finger. The surgery opens into the most contaminated area in this layout. Perhaps this point is belabored too much, but I can not resist adding the comment made by a Tennessean mountaineer during the late war. At a very busy hour in a dispensary such as the one we have sketched, a nurse was caring for this rustic's first minor injury, when he quietly observed, "Miss, if a hornet horned or a bee buzzed through this here place, hell would sure bust loose fer certain!" In this layout it is obvious that, in order to enter surgery or the wards, supplies, physician, nurse, and sometimes the patient, must go through this busy beehive of contamination.

Our discussion of the *Emergency* Function ends with an observation that is widely experienced in industrial Departments. It has to do with any event that calls for carrying a stretcher by or through groups of people at work. A subconscious awareness that "something is going on" has been experienced by all of us at one time or another — like that ripple of excitement which radiates from a fight in the football grandstand and reaches you before you see anything. Something like this seems to happen to the employees when an accident or fainting episode occurs in the work place. It need not be of a serious nature.



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Then a stretcher goes by. That does it! In those who are allergic, the sight of a stretcher will catalyze a host of latent psychosomatic symptoms and complaints. It matters little what is on the stretcher so long as it is under a blanket and six inches thick. A stretcher has a Pied Piper effect on the allergic ones and they will track it to the hospital like a "houn' dawg follows a bunny trail." To be sure some of these well-meaning folks are a bit on the emotional side. Such a one was Winifred, a riveter on the TBM fuselage during the war years of the 1940's. While her hospital visits were a shade above average in number, she was popular among her working associates and was given a high efficiency rating by her foreman. All in all, she was a most dependable employee with an excellent attendance record. One glimpse of a passing stretcher and Winifred left all else and followed. Rarely far behind, she entered the dispensary sighing sobs of sympathy and shedding tears of anxious anguish for whatever or whoever happened to be on that stretcher. She frequently needed and received more sympathy and consolation than was bestowed upon the stretcher passenger. I was never able to identify the events in Winnie's past life that triggered these compulsive responses. The episodes were repeated so often that the medical personnel conferred a title upon Winifred. The title was chosen by vote, and Weeping Winnie won by the narrowest of margins over Wailing Winnie and Winnie Minnie Boohoo. . . .

One day a timekeeper wondered out loud "if Winnie is working." The head nurse observed that the timekeeper need not go back to the time clock to find out. She suggested that a blanket-covered overstuffed sausage be placed on a stretcher and trotted in sight of Winnie's work station. With a twinkle in her eye, the nurse bet that "if Weeping Winnie is working, the sausage won't beat her through that door by more than 30 seconds!"

Of course, reactions like Winifred's are extremely rare, for which medical personnel should be thankful. However, all types and degrees of reaction to the sight of a moving stretcher are manifest in industrial practice. Those who react emotionally form a class unto themselves, and I suspect this class contains a number who would be most likely to panic in the exigencies of a general disaster. Let a stretcher case into your Department and a number of these personalities are sure to follow. They seem to have a knack of getting in the way and promoting distraction. Traits of a morbid vicarious eroticism present in a few can cause occasional disagreeable situations. Once in a while a supervisor of this ilk is encountered. Such usually wears a very visible cloak of self-importance. The added badge of the slightest degree of authority makes these people difficult for the medical personnel to deal with.

The foregoing observation is made because it is pertinent and important to the layout of all Treatment Facilities, Minor as well as Emergency. Treatment Facilities should be designed to be *in*conveniently accessible to nonpatients in general and objectively inaccessible to the particular type of nonpatient we have just described. Take care that the design of your Emergency Facilities allows all stretcher cases to disappear quickly into a zone where none but medical staff are allowed to trespass.

CIVILIAN DISASTER:

War, explosion, fire, flood, quake, riot, tornado — all can cause a local, and a few can cause widespread, civilian disaster. All or some of the local hospitals may be put out of commission. Though undamaged, local medical facilities may prove inadequate to care for excessive numbers of casualties. Under all of these circumstances, industrial Medical Departments could fulfill a vital need. Provision for meeting such eventualities should be taken into consideration during the planning stage.

A DELUGE of minor casualties usually accompanies any disaster. As a rule, industrial Departments are ideally designed, equipped, and provisioned to handle just such cases. There are also those inevitable major casualties whose lives depend upon the institution of heroic medical or surgical procedures as promptly as the control of shock will permit. Facilities set up in industrial Departments to deal with such emergencies would be manned and operated by surgical and medical teams whose local facilities are out of commission, or by other teams assigned and moved into the disaster area by agencies which have planned and are concerned with civil defense and disaster services.

Our project is certainly big enough to be made capable of meeting the foregoing eventualities. With this in mind let us visualize the potential capabilities of the proposed layout. Fig. 7 will suffice for this appraisal.

1. OPERATING ROOMS (SURGERY):

There should be a "SCRUB" lavatory in rooms used for surgical procedures. This layout contains FOUR such rooms, namely, the surgery, men's ward and women's ward, and, in the left lower corner, either the medical write-up room or the adjoining waiting room. A room for preparing, sterilizing, and storing surgical instruments and supplies would be an asset to the functioning of these improvised Emergency surgeries.

2. NON-SURGICAL ACUTE CASUALTIES:

A few selected cases of this type could be cared for in the physiotherapy room.

3. MINOR CASUALTIES (AMBULATORY):

The care of minor cases has been amply described. The male and female examination suites

left upper corner) will not permit stretcher maneuver. There is no plumbing in these suites. Use of these two spaces would be restricted to minor ambulatory casualties. Supplies must be carried to this location.

4. CASUALTY CLEARING AND DISTRIBUTING:

Designate the LOBBY as the point of entrance for civilian casualties and this function can be set up in the Employment Department. If space is available in a room listed in the No. 1 or No. 2 items, those stretcher cases selected as acute can be carried thither through the lower transverse corridor. Ambulatory casualties may be routed through the upper transverse corridor or by way of the factory through the main factory entrance.

5. POST-EMERGENCY CARE:

Some cases should not be moved too soon after initial emergency treatment. There are times when transportation is permissible but impossible. There could be large numbers of such cases that require post-emergency care, and should remain in the proximity of our Department. Under disaster circumstances, it is obvious that very few such cases could remain for any appreciable time within the boundaries of this hospital. The areas surrounding Medical Departments in undamaged idle work places generally lend themselves readily to the establishment of Emergency Facilities to care for large numbers of such cases. In our project, the areas beyond the main entrance to the hospital from the factory, and in the employees' locker room to the right, could be quickly made available for these purposes. We are assuming that medical supplies and equipment necessary to set up such facilities will be forthcoming from those "agencies which have planned and are concerned with civil defense and disaster services."

6. ACCOMMODATIONS FOR VISITING TEAMS:

The nurses' room will serve as dressing quarters for female members of visiting professional and technical teams. The doctor's room will serve this purpose for male members, however, we again call attention to the lack of toilet facilities in the adjoining Examination suites and in the doctor's room.

7. TRAFFIC CONTROL:

The undesirable conditions that we feel will arise from the deficient traffic control inherent in this layout have been amply described in the preceding text. The stress added by services to numerous civilian disaster victims is sure to create bedlam in the Minor Treatment area.

SUPPLY and POWER are two items that should be mentioned before we leave the subject of civilian disaster.

SUPPLY — All industrial Departments maintain a stock of supplies. In very few instances would this reserve of basic supplies be equal to more than three months' normal usage. The demands made by disaster conditions would soon exhaust this reserve. In many sections of the country Medical Departments within zones established by the Civil Defense authority have been officially designated as CASUALTY CARE STATIONS. To cope with civilian disaster, stock piles of basic medical supplies, including cots, stretchers, and blankets, have been stored on the premises of those Departments so designated. If your Department is big enough and in a position to be a refuge in time of trouble, it could be considered an obligation of good medical citizenship to inquire of the local Civil Defense, Red Cross, or other similar authorities concerning such cooperative preparedness. Surely a cache of supplies in case of a civilian catastrophe will provide your Department a considerable head start toward being "ready when the great day comes."

As to the project we are now considering, the acreage, location, and size of factory and Medical Department more than justify local inquiry and the formation of a plan for serving in case of civilian disaster.

POWER — Disruption of power is a frequent companion of civilian disaster. There probably is no source of power now known or yet to be discovered and utilized by man that cannot be put out of commission by the forces of nature or the innate destructiveness of man. This assertion is made in full knowledge that the general use of atomic power is just around the corner. Electricity generated in various ways is perhaps the chief power that delivers active function to public utilities.

Disrupt power and in most instances you are without light, heat, water, and the motive force which delivers many other taken-for-granted commodities that seem almost essential to everyday modern living.

Many industries, large buildings, and general hospitals generate their own power and have their own water supply. Many possess reserve water supply that is independent of power, for the chief purpose of serving fire sprinkler systems. If your Department has the above assets, what we are about to suggest does not apply, for we can be pretty sure that a force great enough to destroy your own power source would include the Medical Department also.

If, on the other hand, your water and power sources are distant and public and there are no standby emergency water and power sources, you will do well to consult your architect and engineer as to the feasibility of the following suggestions:

*A. Electricity* — All electric current used in the hospital to enter at one inlet fuse box and terminate within the hospital. In addition to the main feeder line, an auxiliary feeder line also enters this inlet box — the auxiliary line to terminate at a convenient point within or outside



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of the building, and to be fitted with a receptacle capable of making connection with any number of portable electric generators that are in common use today.

Current-breaker switch in inlet fuse box when on position to admit current from main line, would lock out auxiliary line.

When breaker switch is thrown off, contact of hospital circuit with auxiliary line will be automatic.

*B. Water* — (1) Tap line from fire sprinkler system equipped with spigot in the hospital for emergency medical supply. (2) Storage tank in hospital connected into regular supply source. Storage tank fitted with gravity drain line and spigot, to insure emergency supply when water pressure is zero.

It is hardly necessary to detail the advantages of having made these provisions should power and water supply fall victim during a civilian calamity in your area.

WORKING ENVIRONMENT:

Five Cardinal Points that should be taken into consideration when planning a Medical Department, were listed in the introduction to Section I. The provision of good working and daily living environment for members of the medical staff was point No. 4.

Functional dissection of this plan has already pointed out shortcomings that will most certainly affect the working and living environment of the staff.

To mention a few without further elaboration: uncontrolled traffic; X-Ray through-way; cross motion in Minor Treatment area; distances between center of nursing activity and physician; chances for contamination and secondary infection.

All these will affect the working environment, and there were hints that some of these shortcomings could be remedied by more careful attention to functional design.

No BATHING facility appears in the proposed plan. Ordinances providing toilet and lavatory facilities for the exclusive use of foodhandlers in public eating places are in widespread effect. These ordinances are based on valid principles of sanitation. The same principles apply to medical staff members. Neither foodhandlers nor medical personnel should use the public or general toilet facilities at their place of work. We include BATHING facilities in the case of medical personnel for two reasons:

1. Physicians, nurses, and medical technicians will not practice their professions very long before they will meet some very disgustingly disagreeable situations. Some of these humiliating deluges call for not only a change of clothing but an over-all scrubbing as well. A handy shower is more welcome than any old port in such a storm. Once in a while patients, too, find themselves in a similar unfortunate condition. It would be nice to provide the hospitality of a bath and a change of clothes for these embarrassed and unhappy guests.

2. He fell into the caustic tank! The metal plating tank! The acid container exploded! His clothes are saturated with gasoline! These and a multitude of like mishaps occur in industry. It is needless to detail the almost life-saving value of bathing facilities in some of these cases.

Finally, we call attention to the LOCATION OF THE NURSES' ROOM. In contrast to uses made of the doctor's quarters, patients are not treated or interviewed in the nurses' room. Since this room is not involved in contacts with patients, it should not occupy space that is best allocated to the Treatment Functions. It should be in a location remote from Treatment activities. In conjunction with the Laboratory and janitor's closet, the nurses' room forms an island squarely in the center of the proposed plan. This island must be continuously walked around, thereby increasing considerably the distances and motion required of both patients and medical staff. Rearrangement of the island area that would permit substitution of the physiotherapy room in this location would enhance the functional efficiency of the layout.

THIS concludes our edit, during the course of which the proposed plan has suffered a rather thorough going over. Criticisms have outnumbered compliments. There is nothing new in these critical observations; in fact they are quite obvious to physicians or nurses who have spent as little as one year in industrial practice. However, a pattern and orderly method of procedure have been established that could stand you in good stead should you be called on to edit a proposed plan. The type of orderly functional analysis and scrutiny to which this plan has been subjected uncovers many critical observations that would otherwise be overlooked. The four points on which this procedure is based can be summarized as follows:

1. Determine the over-all characteristics, size, and demands of the job you are planning for, in terms of an average working day.

2. Consider the source, motion, flow, and control of the total patient traffic.

3. Divide the total job into the three chief functional components — *(1) Examination, (2-A) Minor Treatment,* and *(2-B) Major Emergency,* and consider each one as a separate group of facilities.

4. Coordinate the three facility groups so that they will function simultaneously with a minimum mixing of patients and a maximum economy in distance, time, and motion of medical personnel in their to-and-fro services among all groups of facilities.



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This type of analysis not only uncovers errors in a proposed plan; it also supplies the reasons to support your suggested changes. It is the backbone of *constructive* criticism. Though your suggested changes be vital to efficient functioning, it is natural for architects to resist alteration of plans that look good to them on a drafting board.

However, it has been my own experience that if your suggestions are backed by data and the type of specific reasoning that has been presented and used during this edit, architects will (with very few exceptions) cooperate wholeheartedly and with enthusiasm. There have been instances when their comments after tutelage implied the rebuff "why haven't you fellows pointed out these so obvious things to us long ago?"

While the pattern and orderly method of procedure here outlined have been used as a guide in editing a proposed plan, they will prove equally effective in planning a layout from scratch.

Having taken the proposed plan apart, both management and architect have every reason to expect us to put it together again. This will be done in the following section. However, before inspecting the revised plan, it could be a pleasant exercise to try your hand at it. Take your drawing board and lay out a quarter inch to the foot area 75 x 65 feet, and see what you come up with. The areas surrounding the Department will, of course, be the same. You have the privilege of changing any or all entrances.

Throughout this edit, criticisms, errors and omissions that have been pointed out were interspersed with sufficient suggestions and hints to form a good idea of what is desirable in a revision.

However, having no architectural training, the author has reason to expect, and indeed welcomes, layout plans created by readers that will beat all hollow the revised plan that will appear in the next section (Section III).

## Appendix

PREDETERMINING daily case load if this project were a *NON*-MANUFACTURING (white collar) occupation with 4,000 employees:

"The ratio of 1:50 will prove reasonably accurate for predicting the average daily case load" (Treatment Function cases).

4,000 ÷ 50 = 80 treatment cases per day.

80 = 93% of all types of cases.

1% = 80 ÷ 93 = .86021 — applying this 1% factor to Table II, right hand column, *non*-manufacturing occupations, gives the following data that correspond to Group "B":

GROUP "B"

NON-MANUFACTURING OCCUPATION — AS TABLE II:

| Percent of Total | Types of Cases | Number of Cases |
|---|---|---|
| 3% | New Injuries | 3 |
| 7% | Retreatment | 6 |
| 83% | Sick Complaints | 71 |
| | Total Treatment Function Cases | 80 |
| 7% | Examinations | 6 |
| | Total all Cases | 86 |

"Design treatment facilities to serve a daily number of cases 30% in excess of the annual average daily expectancy." Applying this to the above data, yields the following which corresponds to Table XIII:

*Non*-Manufacturing Occupation — All Functions in Operation
Daily Case Load to be Planned for — 4,000 Employees Working

| Types of Cases | 1:50 Annual Group "B" | 30% of Group "B" | Total Cases | Progressive Total |
|---|---|---|---|---|
| New Injuries | 3 | 1 | 4 | 4 |
| Retreatment | 6 | 2 | 8 | 12 |
| Sick Complaints | 71 | 21 | 92 | 104 |
| Total Treatment Function Cases | 80 | 24 | 104 | |
| | | | Examinations | 6 |
| | | | Total all Cases — | 110 |

The following figures correspond to Table XIV:

STEP I—

Daily Flow Chart of Medical Service
9 Hours of Service (540 Minutes) — Step I

| | | | Cases | Total |
|---|---|---|---|---|
| II — Minor Treatment Facilities | | | | |
| Function 2-A | | | | |
| (a) | 52% | Minor Treatment Area | 57 | |
| (b) | 18% | Eye Rooms | 20 | |
| | 70% | | 77 | |
| (c) | 15% | Physiotherapy | 16 | |
| (d) | 5% | Rest — Recovery | 6 | |
| | 20% | | 22 | |
| | 90% | | Green | 99 |
| III — Major Emergency Facilities | | | | |
| Function 2-B | | | | |
| | 1% | | 1 | |
| | | | 1 | |
| | | | Red | 1 |
| Total all Treatment Functions | | | | 100 |
| I — Examination Facilities | | | | |
| Functions 1-A, 1-B and 1-C | | | | |
| | 7% | Scheduled | 7 | |
| | 2% | Not Scheduled | 3 | |
| | 9% | | 10 | |
| | | | Yellow | 10 |
| Total all Functions | | | | 110 |



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To determine Step II (Time Rhythm) and Step III (Time Spent in Hospital) apply the same methods as described on page 88.

The Pre-employment Examinations scheduled during the first six months will be the same as outlined in the "Schedule Function 1-A." The daily average of seven scheduled examinations shown above would be subject to the local quit rate as discussed under (1) EXAMINATION FACILITIES.

Note: Additional data received from departments serving non-manufacturing (white collar) occupations:

*Annual* daily ratio of treatment function visits to the numbers of employees working: 1954 — 1:66.9; 1955 — 1:65.0; 1956 — 1:42.6; 1956 — 1.31.3 = 205.8 ÷ 4 = 1:51.45. This lends some additional support to the premise that the ratio of 1:50 will prove reasonably accurate for predicting the average daily load of cases, when planning for a non-manufacturing occupation.

(28536 Wildwood Trail, Farmington, Michigan.)

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## Able and Stable

COMPANIES that establish formal age limits for various classes of jobs may be excluding many highly-productive older workers, indicates new Labor Department study. The widely-held belief that output-per-manhour of over-45 workers is considerably lower than that of younger employees is refuted in this study of over 5,000 production workers in 22 companies in wooden household furniture and footwear industries. (These two industries show distribution of men and women workers throughout all age groups which is similar to manufacturing as a whole.) Although productivity of workers in the 45-64 age group tends to decline somewhat, individual variability within each age group is quite large, Labor Department study reveals. Substantial proportions of workers in older age groups perform better than average for other younger groups. For example: nearly half of women aged 45-54 in both industries have higher output-per-manhour than the 35-44 age group average. Even in the 55-64 age group, in most cases about one-third of workers perform better than average for the 35-44 age group. Same pattern repeats itself in analysis of productivity of age groups in relation to type of work performed. In other words, there are generally small differences between age groups up to 64, with wide variability within age groups. Says Labor Department: "These results indicate that an individual evaluation of a worker is far more important than any general ideas concerning the relationship between age and productivity, and that any attempt to establish formal age limits for various classes of jobs, even where the job content is clearly defined, fails to take into account the wide variability of ability levels shown by persons of the same age." How does absenteeism record of over-45 workers compare with that of younger employees? There's almost no difference in attendance records between these two groups, study reveals. In the footwear plants, indexes of attendance vary by less than 1% for men and 1.2% for women. In furniture plants, they vary by less than 4% for both men and women. How "stable" a work force is the over-45 worker group? Labor Department reports that the percent of workers who remain on the job is highest for ages 45 through 64. Workers under 25 years and workers who are 65 years and over have the highest percent of separations. Decline in continuity-of-service indexes for the 65 and over age group largely reflects influence of retirement.

—From *Industrial Relations News*, January 18, 1958.

# The Acid Mantle of the Skin Surface

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FOLKLORE and household practices for centuries have favored vinegar rinses and lemon creams.[1] They reflect preference for acid applications to the scalp and skin. Experience and laboratory studies confirm the validity of the acid mantle of the skin surface.

Unna and Golodetz[1] were among the first to investigate the reaction of the skin surface. They studied the reaction to application of the indicator Nilrot (Nile Red). They determined by staining that the entire epidermis was acid, and the cutis alkaline.

Heuss[2] used litmus. He reported acid reaction of the epidermis. Others of the early period include Schmidtmann,[3] Sharlit and Scheer,[4] and Sharlit and Highman.[5]

The pioneers used chemical dye indicators. The early studies of the pH of the alcohol-cleansed surface of the inside of the elbow (cubital fossa) was reported to be on acid side. Removal of the fat and sweat products had no effect, according to the first students of the reaction of the skin surface. They explained acidity of the skin as the function of the keratin layers.

It is now generally accepted that the closer the layer of the skin covering is to the underlying tissues, the closer its normal reaction approximates the reaction of the blood; that the cutis or true skin is more alkaline than the overlying epidermis; and that the surface of the epidermis and the basal cell layers are more acid than the underlying cutis. Stated another way: there is a constant fall of hydrogen ions (decrease in acidity) toward the depth of the skin. The acidity is reduced in the lower horny layers. Neutrality is reached in the Malpighian layers. The cutis approximates the alkalinity of the blood. The reaction of the exposed papillary body was reported as alkaline.

FEATURES, particularly the nomenclature, of hydrogen ion concentration are offered:

pH is the symbol usually expressing hydrogen ion concentration. It is arrived at as follows:

The ions in a molecule of the purest water are electrical H with a positive charge (+), and electrical OH with a negative charge (−). The total concentration of each of these oppositely charged ions in purest water is 0.000,000,1 gram ions per liter. This is represented mathematically as $1/10^7$. One liter $H_2O$ = H(+)$10^{-7}$ gram ions and OH(−)$10^{-7}$ gram ions. The total is $2 \times 10^{-7}$; the product is $10^{-14}$. This represents a product constant, not a total concentration.

Thus the hydrogen ion concentration is $1/10^7$ or $10^{-7}$. The hydroxyl ion evaluation is also $1/10^7$ or $10^{-7}$. Each is present in an equal amount in the molecule of water.

The introduction of a third substance, gas, liquid, or solid may disturb the relative ratio of H and OH ions. Their sum always is equal to $1/10^{14}$ or $10^{-14}$. It is necessary only to state the concentration of the hydrogen ions; the hydroxyl ions may be calculated.

Electrochemical neutrality is determined by the presence of equal hydrogen ions and hydroxyl ions, expressed as $H = 1/10^7$. An excess of hydrogen ions confers ACID characteristics upon the solution; an excess of hydroxyl ions confers ALKALINE characteristics.

The expression H-$1/10^7$ to denote electrochemical neutrality is cumbersome. It is replaced through this step:

$$pH = \frac{1}{\log 1/10^7} = \frac{1}{\log 10^{-7}} = \log 10^7 = 7$$

Thus pH is expressed as the logarithm to the base 10 of the reciprocal of the hydrogen ion concentration.

Solutions having electrochemical neutrality are pH 7.0. A solution having electrochemical acidity is less than pH 7.0; the intensity of the acid increases and the pH number decreases. A solution of pH 6.6 is slightly acid; one of pH 6.0 is more acid; one of pH 4 is very acid.

A solution having electrochemical alkalinity is more than pH 7.0; the intensity of the alkalinity increases and the pH number increases. A solution of 7.14 is slightly alkaline; one of pH 9.0 is more alkaline; one of pH 14 is highest alkalinity — hydroxyl concentration with no hydrogen ion measure.

| ACID | | | | | | | NEUTRAL | | | | | | | ALKALINE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |

Blood has a pH between 7.3 and 7.4; it is normally slightly alkaline; it cannot become acid, since the acid-alkaline balance is maintained by the "buffer" compounds. These are organic and

inorganic. The most important organic buffers are the proteins with their amino ($NH_2$) alkaline group combinable with acid. The carboxyl (COOH) acid group of the proteins is combinable with alkali. The most important inorganic buffer is the carbonic acid-sodium carbonate system. The alkaline bicarbonate provides $CO_2$ which is eliminated from the body mainly by expiration. Alkaline phosphate also helps maintain the alkaline reserve.

THE surface of the healthy human skin is near a pH or 5.3. Hence the name "acid mantle."

Burtenshaw,[6] in his work, "The Autogenous Disinfection of the Skin," states: (1) The skin over most of the body surface is normally acid (about pH 5.5), except in areas furnished with apocrine sweat glands. (2) The sweat is capable of producing the reaction of the skin areas upon which it is secreted, though probably the sebum contributes to this acidity.

The acidity of the normal outer surface of the skin helps the skin destroy several types of common disease-producing organisms. Invading organisms require neutral or alkaline media for growth. It is generally agreed that the acidity of the normal skin surface maintains self sterilization. Burtenshaw demonstrated a progressive fall in the number of streptococci recovered within a given time from normal (0.85%) saline through the pH range 7.5 to 5. The fall in recovery rate is usually more steady below pH 5.

A reaction away from acid toward alkaline of the skin covering causes coagulation of the colloids of the keratin layers. This reduces their stability and resistance to infection. Thus reaction away from acid toward alkaline favors the microsporon infections of the scalp of young children. It also favors abscess infection of the axillae of adults. Progress of tinea marginatum of the groin region is hastened by the pH away from acid toward alkaline. The same holds for yeast infections of the genitocrural area, perianal areas, interdigital spaces, and certain areas of the sole.

Naming the skin glands requires a few explanatory paragraphs.

Glands of the skin have been studied by many histologists. Ranvier[7] described:

*Holocrine* (secreting) glands: the cell of the gland forms part of the secretion, as in the sebaceous type, and disintegrates entirely.

*Merocrine* (partly secreting) glands: the cell does not form part of the secretion but remains intact, as in the sweat glands; or only part of the cell forms a component of the secretion.

Schiefferdecker[8] further divided the merocrine glands into:

1. *Eccrine glands:* the cells are truly secretory cells; they are found in extenso only in the human race. The eccrine gland is the small coil gland, or the ordinary sweat gland. It secretes a fluid. The cell structure does not enter into the formation of the secretion as a component; the eccrine gland remains intact. The secretion of this gland is acid, pH 3.8 to 5.6. The surface of the hairless skin of the face is mostly acid. The cubital fossa is acid in reaction. The skin glands here are exclusively of the eccrine series.

2. *Apocrine glands:* their cells, at least partially, are components of the secretion. The apocrine gland is widely found in animals; and in varying degree in many human races. It is the large coil gland, or the limited gland. It is connected with the hair follicle, and empties into it. Among women, it is more strongly developed than in men. It has some biologic significance in menstrual and pregnancy cycles.

The apocrine glands are found in the axilla, about the genitals, and about the nipples.

In the axilla these glands are arranged in a layer about 3 mm thick. Some observers regard this as abnormal. The apocrine glands of the axilla vary with the age of the subject. Loeschecke[9] pictured the meager layer in a child, the rather rich layer arrangement in a woman prior to menstruation, and the more meager gland structure in the old woman.

About the genitals, mons veneris, and perianal region these glands are rarely developed as well as those in the axilla even in women. About the breast they vary from type. The closer they lie to the mammary gland, the more they approximate this gland.

The apocrine glands secrete but also carry along with their secretion some part of the cells of their inner layer which forms a cupola. The secretion of the apocrine glands is more or less neutral (pH 6.2 to 6.9).

The sites of skin with aprocrine glands are less acid than sites of skin with eccrine glands. Some areas of aprocrine glands are found to be away from acid toward the alkaline side. At least the reaction of the secretions and excretions into the axilla are closest to alkaline on the human.

THE ACID pH of the skin surface is produced, according to physiologists, to an acid concentration following evaporation of the secretion of the small sweat glands or eccrine glands. Acid eccrine gland sweat is made inside the skin. A duct leads from the gland taking the sweat to the under surface of the epidermis. The duct may add a quotient to the final sweat product. The sweat reaches the surface through the spaces between the cells of the epidermis.

Variation from the acid pH of the skin surface depends upon character and amount of the eccrine glandular sweat; character and amount of the insensible watery perspiration (water reaching the surface by other than the sweat-making gland mechanism); prevention of evaporation of

eccrine sweat resulting in alkaline ammoniacal disintegration; and character and amount of sensible and insensible product from the so-called oil glands, since normal secretion of these aprocrine glands is weakly acid or neutral but may undergo alkaline decomposition during evaporation.

Other influences on the acidity of the skin surface are the presence or absence of the keratin surface, the character of the underlying layers of epidermis, and the electrochemistry of the environment. The pH of the skin surface changes from day to day on the same person; and on the same area of the person during the same day. Excess production of sweat influences the pH of the skin surface. Conditions retarding evaporation make a difference in the pH of the surface of normal skin. Adhesive layers and many layers of clothing tend to reduce the acidity of the skin surface, other conditions remaining the same.

The acidity of the skin surface increases during hot weather. Increased gland perspiration as in hyperidrosis also increases this acidity. Investigators are agreed that certain areas of the skin are less acid than others. In fact, these areas may be weakly acid, neutral, or under certain conditions, may have a degree of slight alkalinity. They are: scalp of infants and children, axillae of adults, genitocrural folds, interdigital spaces, and certain nonspecified areas of soles.

Anderson[10] reported pH as high as 7 in the axillae of adults. She thought this was due to the stagnation of the apocrine sweat. She reported a shift to the alkaline side in patients with seborrhoic dermatitis, relapsing impetigo, seborrhoic sycosis, and chronic blepharitis. The whole body surface showed this shift. She suggested in these patients a total loss of local resistance in the skin due to a faulty buffering power and abnormal keratin formation.

THE SECOND group of abnormal pH includes patients with alkali dermatitis. Alkali readings of the hands as high as pH 12 were obtained by Anderson after exposing the hands to soap solutions and detergents. She assumed the keratin in the stratum corneum remains in a hydrated state and without buffering power under these conditions.

Investigators have reported estimates of the pH of the skin for exposed areas of adult males and females, and boys and girls between three and 14 years of age. The valuation was from 4 to 7, mostly 4.2 to 5.6. Adult females varied more widely from individual to individual than the males. The adult female gave a pH slightly higher (0.5) than the males. The cause suggested for the less acid pH of the skin surface of the grown women included applications of soap, cosmetic lotions and cremes with alkaline soap base, and the influence of the menstrual cycle.

The extensor surface of the arms was more alkaline (less acid) 5.3, than the corresponding parts of the flexor surfaces, 5.1. The cubital fossa was the most acid area on the arm. The groin value was 5.7; the axilla, 5.8; the fourth interspace of the foot, 6.5. Female children were slightly less acid than male children.

Reduced acidity but not neutrality is reported in hyperkeratoses as in psoriasis. Seborrhoic eczema was noted earlier. Less reactive skin conditions associated with seropurulent discharges give lessened acid reaction but not neutrality. pH indicating alkalinity of the skin covering is associated with ulceration of tertiary syphilis and tuberculosis. Leg ulcers with poor healing tendency and slow granulation also give pH indicating alkalinity. Contrariwise, good healing ulceration gives less alkalinity. Healing granulation tissue has mildly acid reaction.

Burckhardt[11] introduced a simple method of measuring the alkali neutralization of the skin. He determined, on the basis of 1,082 tests in healthy persons, that 62% had a rapid, 20% a medium, and 17% a slow neutralization. He decided that slow neutralization corresponds generally to lowered resistance, and vice versa. He concluded that poor acid neutralization corresponds to poor acid resistance. Good alkali neutralization and resistance are generally coupled with good acid neutralization. Each is influenced by sweating. Regions with a thick corneum are more acid — and alkali — resistant. This is due to a buffer capacity against acids and alkalies, which is probably influenced in the first place by the aminoacids of the corneum, and in the second place by $CO_2$ diffusion. The buffer capacity is lowered on sick or convalescing skin. The alkali neutralization resistance is fairly constant with the exception of seasonal changes in the thickness of the corneum. It deteriorates after the sixty-fifth year of age.

PATIENTS with occupational eczema and dermatitis caused by alkalies, acids, cement, soda, or soap showed a slow alkali neutralization in 72% of 291 cases,[11] and a lowered alkali resistance in 65%. Prolonged contact with acids and alkalies harms the buffer capacity of the skin. Damage to the skin by alkalies causes dermatitis and sensitivity to industrial materials and skin bacteria. This has also been proved experimentally with nickel and turpentine eczemas.

The acid alkaline balance is increasingly important in the actual determination of causes of occupational dermatoses. The worker in the factory, the home, and at his hobby is involved. Exposure to soap, disinfectants, parasiticides causes untoward reaction. The pH of the skin and the pH of the application are involved.

There is growing realization of the factor of acid pH in the care of the skin in health and disease. The former alkaline soap emulsification

(saponification) of creams for application to the skin gives way to modern formulation. A product is provided with pH in the acid range away from alkalinity. The production requires new technical skills and ingredients unknown to the pharmaceutical manufacturer of a decade back. For example, inclusion of compatible chemicals in an acid-reacting cream enhances the activity of hormone steroids and antibiotics.

Gross[12] and his associates recently varied the technique used by Burckhardt. They incorporated phenolphthalein in the 1/80 N sodium hydroxide to make a concentration of 1:2000 phenolphthalein, and used a drop of this colored solution from a pipette which delivered about 24 drops per cubic centimeter. Another addition to their technique was the measuring of the pH of the skin before and after the tests, which gave additional control over the correctness of the results. They summarized 30 cases and 36 controls. Their findings gave an unequivocal result. Nummular eczema and housewife eczema show an impairment of the alkali-neutralizing power of the skin. Patients with the allergic type of contact dermatitis and atopic dermatitis and patients without eczematous eruptions showed a predominance of normal alkali neutralization.

The similarity of the clinical findings and the results of the alkali neutralization tests suggest that housewife eczema and certain other types of so-called primary irritant dermatitis are variants of nummular eczema. They differ fundamentally from other forms of contact dermatitis. The difference between the nummular eczema type of reaction and the contact allergic sensitivity reaction of the skin can be correlated with the laboratory findings.

These authors (Gross *et al*) agree that the studies of Burckhardt and others indicate that alkali neutralization is primarily the function of the amphoteric amino acids of keratin. The maintenance of normal keratinization is an important prerequisite to successful therapy in eczemas showing an impaired alkali neutralization. They conclude that the objective should be approached by using nutritional therapy and measures devised to correct any systemic disturbances. They added a cream containing a buffered solution in a water-miscible base to the therapeutic regimen.* This is helpful in maintaining the normal pH after washing with soap. It has given satisfactory results in a prolonged clinical trial.

The article by Gross and his co-workers[12] cites 28 important and pertinent references. Physicians responsible for the care of the hands of workers find these references to industrial dermatitis and its prevention highly interesting. This article and others lead to the definite conclusion:

The current and future aspects of topical applications for the skin surface are influenced by the results of study of the pH of the skin surface in health and disease. The tendency, in fact the mode at the moment, is the application of the acid-reacting cream. The preference is for suitable acid applications to the skin and scalp — the maintenance or re-establishment of the acid mantle.

(18 East 89th Street.)

*Acid Mantle Creme®, Dome Chemicals, Inc.

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# Safeguarding Executive Health: —What Industry Is Doing

LYDIA STRONG, New York City

THE PACE THAT KILLS. . . . WHY EXECUTIVES DROP DEAD. . . . EXECUTIVES FACE SPECIAL HEALTH HAZARDS. . . . YOUR NEXT PROMOTION CAN KILL YOU. . . . THE BOSS DIES YOUNG.

Small wonder if many business men, exposed for the past few years to a succession of scare headlines like these, suffer occasionally from heart palpitations, sweating palms, and the gnawing suspicion that they are doomed to die before their time.

As a matter of plain, undramatic fact, however, the executive life seems to be a lot less hazardous than most executives have been led to believe. Figures compiled by the National Office of Vital Statistics indicate that men of the managerial, technical, and administrative level, as a group, have lower than average mortality rates. And life insurance companies, surely among the least reckless of human institutions, sell policies to men in these executive or higher-level occupations, in general, at the lowest premium rates.[1]

Most of the industrial physicians interviewed for this article stated emphatically that executives do not have special medical problems. Dr. C. A. D'Alonzo, Assistant Medical Director of E. I. du Pont de Nemours & Co., who has compared health examination findings for executives of the company with those for rank-and-file employees of the same age, finds "no evidence that the executives are in any worse state of health than other employees." In fact, he reports, DuPont top executives seem *less* likely than other employees to suffer from two dangerous disorders: heart disease and high blood pressure.

## Why an Executive Health Program?

WHY, THEN, if executives are at least as healthy as the average, have so many companies jumped on the executive health bandwagon?

In the first place, as doctors are quick to point out, "average" health is not good enough. A group enjoying as many material advantages as executives ought to be conspicuously healthier than average. If they aren't, this suggests some occupational risk in the executive job — a problem which industry should tackle just as it has tackled the problem of hazards in production jobs.

Secondly — and this has been probably the basic consideration in most executive health programs — a company has no asset more precious than the good health of its managers. The death or serious illness of a key man can embarrass a large firm — and it can wreck a small one.

One midwest company had to hold up all plans for a new factory for three months, while the president fought a kidney ailment. The delay cost the company several hundred thousand dollars in added costs and lost sales.

In another case, a brilliant promoter organized a profitable, fast-growing plastics business, under tight one-man control. He was always ambitious, so his subordinates hardly blinked when he began talking of rigging up some sort of super holding corporation which would take over a big chunk of the industry. But his plans did not crystallize. He began forgetting important appointments. His speech grew increasingly garbled. On the day he instructed his treasurer to draw a check several times the size of the company's bank account, a doctor was at last called in. The diagnosis: a progressive brain disorder — which could have been caught in time by a simple test, had this busy man ever taken time out for a health check-up. Within a few months he was dead, the company he had built was ruined, and a large number of people, including his widow, were looking for jobs.

A giant manufacturing company suffered a crippling casualty rate among its executives year after year, until it got around to installing a health examination program for its key men. The results were a spectacular vindication of preventive medicine: five years later, the executive death toll had been slashed by 62%.

## Periodic Health Examinations

CLEARLY, the proponents of periodic health examinations for executives have a good case — but how much action has come of all the talk? To throw some light on the current status of health examination policies in industry, *The Management Review* recently surveyed a nationwide cross section of medium-size and large companies of all types. The size range was from below 1,000 employees to 500,000, with a median of 2,500.

The current upsurge of interest in executive health showed up sharply in the over-all response to the survey; more than half of the 847 firms queried had replied by the deadline date.

Of the 447 companies replying, more appear to be interested, as a matter of corporate policy, in hiring a healthy physical specimen than in keeping him healthy on the job: 310 companies, or 70%,

From *The Management Review*, published by American Management Association, May, 1957. Reprinted by special permission.

1. The statement once attributed to the Metropolitan Life Insurance Company, that executives have 10% less life expectancy than their employees, was not in fact issued by the company, which has no recent data on the subject.



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require an executive to undergo a physical examination as a condition of hiring, while 238, or 53%, offer examinations to executives already in their employ.

Company size appears to have little influence on the requirement for a hiring examination, but it is a definite factor in on-the-job examination policy. The larger the company, the more likely it is to have a program of periodic health examinations. Three-fourths of the large firms (more than 5,000 employees), and half of the smaller ones, offer some kind of executive health examination plan (Table I). Every respondent with over 10,000 employees has a plan. The vast majority of these programs are on a periodic basis, usually annual, but sometimes with special provisions for older and for younger men.

In a few companies, the examinations are given on some non-periodic basis such as before promotion, upon request, or where there is felt to be a health problem.

TABLE I.
COMPANIES HAVING EXAMINATIONS FOR EXECUTIVES, OTHER THAN HIRING EXAMINATIONS, ON AN ORGANIZED BASIS

| | Up to 5,000 Employees | | Above 5,000 Employees | | Size Not Stated | | Over-All | |
|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % |
| Have examinations | 164 | 49 | 74 | 74 | — | — | 238 | 5 |
| Do not have examinations | 171 | 51 | 27 | 26 | 11 | 100 | 209 | 4 |
| | 335 | 100 | 101 | 100 | 11 | 100 | 447 | 10 |

TABLE II.
FREQUENCY OF HEALTH EXAMINATIONS

| Basis for Health Examinations | No. of Companies |
|---|---|
| Annual | 193 |
| Other periodic basis[1] | 11 |
| Non-periodic basis[2] | 15 |
| Basis not specified | 19 |
| Total | 238 |

[1]Biennial; triennial; every 18 months.

[2]Before promotion or transfer; as requested by executive or by company (as after an illness); when there is a health problem; after retirement age, in order to continue working.

## Who Is Examined?

EXECUTIVES and other employees fare alike in about half the companies, but this similarity occurs much more often on the negative than the positive side. That is, of companies having executive health examinations, only three out of 10 make the same examinations available to all employees. But of the companies *not* offering health examinations to executives, three out of four don't have them for any other group of employees, either. Forty-three firms, in effect though not by intention, discriminate *against* executives: they have health examinations for production workers, or temporary workers, or workers in dangerous jobs, but not for the managerial group.

Where executives are favored — as they are in 162 companies — the line may be drawn at top management, at middle management, or at the supervisory level. Some firms include everyone earning above a certain salary: $7,500, or $10,000, or $20,000. Some have examinations for all employees, but more comprehensive ones for executives. In a few companies, eligibility for examination is determined by age or physical condition rather than by status.

Opinion varies widely on the question of whether or not the examination should be compulsory. One experienced clinician wishes it could be because, he says, "When it's left optional, the very men who need it most won't go. The man who's afraid the findings may be serious will stay away because he's afraid it will get back to management."

Other doctors feel just as strongly that a compulsory examination is self-defeating. "Make them submit and you lose half the benefit. They regard themselves as guinea pigs. Under these circumstances they're much less likely to be frank with the doctor, or to heed his findings."

There is also the consideration that some executives have religious objections to physical examinations, and that others are already under medical care and don't need a new diagnosis.

Health examinations are compulsory in 56 of the companies surveyed; 132 report that the examination is "optional, but urged by the company"; 40 say it is "entirely voluntary." Large companies are less likely than small ones to force the issue; in some instances, at least, the optional plan was adopted as a compromise with stiff-necked top managers who would quit rather than submit to a compulsory examination.

The full cost of the health examination is paid by the company in practically every case. Among the 11 exceptions, the company pays full cost for top managers, part cost for middle managers; or the company pays the bill for a clinic or doctor of its choice, but the executive pays all or part if he prefers to go to his own doctor. A few firms set up cost limitations — $30 or $75 or $100 — and the executive pays for any additional tests that may be required.

In general, the examinations have met with excellent acceptance. Almost half the companies report 100% participation; in seven out of ten, at least 90% of eligible executives participate in the program.

## Who Makes the Examination?

A HEALTH examination may be handled by the company doctor or Medical Department, or by an outside doctor or clinic designated by the company, or by a doctor or clinic chosen by the executive himself. A growing vogue for outside medical facilities is reflected in the survey findings: half the companies send executives to an outside doctor or clinic, and only about one-fourth use the company doctor or Medical Department. Oddly enough, large companies — which might be presumed to have more complete Medical Departments — are more likely than small ones to use outside clinics. About one firm in 10 permits executives to go to doctors or clinics of their own choice, but many will let them choose from an approved list furnished by the company. Thirty-one firms have flexible arrangements — i.e., the executive is given a choice of



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company Medical Department, company-approved outside clinic, or his own doctor or clinic. Where the executive has full choice of doctors, a minimum standard examining procedure is often required.

Various reasons are given for preferring outside doctors or clinics. Some companies use them for convenience; not every executive is near a branch having a full Medical Department. But other companies, with superb medical facilities of their own, nevertheless send their top men halfway across the country for medical check-ups at clinics of their choice. Prestige is one reason for this, desire for privacy another. For some men, the trip and the stay at a resort-type clinic may provide a few days of needed vacation.

All things being equal, many Medical Directors feel, there are several factors favoring the use of company facilities. In the first place, they are more convenient and possibly (though not necessarily) cheaper. Then there's the question of over-all morale: if the Medical Department is good enough for other employees, it ought to be good enough for the top men. Third, the company doctor knows the executive, understands the special conditions of his work, and may therefore be better able to advise him. Fourth, follow-up of medical recommendations is easier. Fifth, should the executive become suddenly ill, the records on his physical condition are readily available.

Despite these advantages, many top men shun company facilities. "Are you having your exam here?" one big-company executive asked another. "Yes," was the reply, "but I wouldn't if I thought anything was wrong with me."

What this boils down to is the question of confidence. "We have more executives applying for examinations now than we can handle," said the Medical Director of an electronics firm. "But the men had to learn gradually, over the course of several years, that the Medical Department had — or would make available — the same facilities as a clinic, that the doctors were as competent, and that confidential findings would not leak out."

## What Price Privacy?

NO ISSUE concerning company health examinations is more debated than that of confidentiality. About half of the companies surveyed which have health examinations require that the report be rendered routinely to the executive alone; most of the others have reports going to both the executive and the company, and 16 have reports sent to the company but — curiously enough — not to the man examined.

But when the examination discloses a serious condition which might affect the executive's job performance or promotability, the procedure changes. Under these more critical circumstances only 82 companies (37%) confine the report to the man alone, or to the man and his personal physician. In 130 companies, the executive and others — the company president, the company Medical Director, the personnel department, or the executive's immediate superior — are informed. In 10 companies only the company — not the executive — gets a direct report of the bad news. In some firms the report of a man's serious illness, far from being kept confidential, goes to three or four persons or departments.

The reasons for reporting a man's physical condition to the company, as elicited in interviews, seem to be twofold: (1) Putting it baldly, the company is paying for the examination, and the report may be helpful in promotion planning, so why shouldn't the company get what it pays for? (2) An executive suffering from, say, a serious heart condition may need to be protected against himself. If he won't slow up voluntarily his superior must be notified to ease his load, to refrain from adding burdens, and to start thinking about making arrangements for his retirement if necessary. So, it is argued, the reporting is for the executive's good as well as the company's.

Small firms seem much more likely than large ones to favor reports to the company. Of the 10 largest companies covered (72,000 to 500,000 employees) all require that routine reports go to the executive alone; even where serious disorders are discovered which might affect job performance, nine still have the report rendered only to the executive.

"It's between the man and his doctor," the Medical Director of a manufacturing company explained. "We don't use medical examinations in manpower planning. The executive is expected to use his own common sense." A railroad personnel man said: "We rely on the executive, if anything is found that may affect his future, to confide in his superior. We feel he's grown-up enough to do that." This company has, incidentally, dropped an earlier reporting plan. The new one, after several years' experience, is considered a great improvement. "Now the men feel grateful; before, they felt their privacy was invaded." The Medical Director of an oil company said: "The health of an individual is his own problem. Health examinations are not used as an instrument of promotion or policy."

Many doctors object to reporting to outsiders on a man's health because they regard it as a violation of the doctor-patient relationship. Also, without consent, such a report is illegal in most states. Consent can of course be obtained; also, many doctors do routinely report findings to company officials. But, some of them contend, this procedure frustrates the principal objective of the examination as a preventive health measure; men simply won't tell the examining physician about disquieting symptoms, or about disturbing situations in their personal lives, if they feel that these may be reported.

This does not refer to physical symptoms alone. A manufacturing vice president, for example, had been fighting a tough battle with his wife's alcoholism. In this fight he had the help and advice of the company doctor. "This is a definite part of the man's health picture," the doctor reported. "But he would never have revealed it if the medical records were not confidential."

Many dangerous physical conditions can be found on examination, it may be argued, even without the cooperation of the examinee. But such conditions occur in a minority of cases; furthermore, when they do occur, and when the executive understands the gravity of the situation, he will in most cases



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report it voluntarily. The company has to decide which is more important: to be tipped off on a few dangerous cases, or to conduct the program in a way which promotes maximum health for all executives.

### What's the Goal?

DR. ANTHONY LANZA, Director Emeritus of the New York University-Bellevue Institute of Industrial Medicine (and former Medical Director of several large companies), believes strongly in the latter procedure.

"A medical department can't play God," he says. "It can't give management guarantees about promotability. You can examine a man by every modern technique, find nothing serious wrong with him, and have him drop dead of a coronary one week later. The job of the Medical Department is to help executives to keep healthy, to help them with remediable conditions, not to predict what will happen to them. An examination system designed to help solve promotion problems is folly."

The entire success of the program may depend on the company's goal, he feels. "If management wants preventive medicine, the health examination can do a good job. But if it wants the Medical Department to take over decisions concerning promotion, it will fail."

None of this, of course, precludes medical reports made to management at the executive's request.

The Occupational Health Institute, an affiliate of the Industrial Medicine Association, advises that a company should "enforce a policy of the very strictest confidence about employee health cases in the Medical Department. If the health service thinks it desirable to communicate with the company about a case — as when, for instance, a change in work routine seems desirable — it should be done in conference with the employee and the director of personnel, or other executive appointed for that purpose."

### Scope of the Examination

WHAT is included in an examination must of course depend on what the company can spend on it; nevertheless a superficial examination may be worse than none at all, since it gives meaningless reassurance and prevents the subject from seeking more thorough medical advice.

How much time the examination takes is one measure of its thoroughness, though not necessarily the most reliable. Among respondents to *The Management Review's* survey, half-day examinations are most prevalent (97 companies); 50 companies do the examination in about an hour; and 77 give it a full day, or several days. Except for the several-day examinations, the time may be divided into installments — typically, a comparatively long period for medical history, physical examination and tests, plus a shorter period — perhaps a week later — for a counseling interview. Large companies are more likely than small ones to give lengthy examinations.

All programs described by respondents include a physical examination; the vast majority also include taking the patient's medical history, a chest x-ray or fluoroscopy, an electrocardiogram, and an interview with the examining physician. These are the only procedures about which specific inquiry was made in the survey. Close to half the companies, however, routinely include further tests, and many give any test that seems desirable for the individual.

Tests and examinations of the blood and urine are included by about one-third of the respondents. The "GI series" — a set of x-rays of the gastro-intestinal tract — is given routinely by a small minority, as are rectal examinations, tests of vision and hearing and — by a very few — gallbladder x-rays.

A discussion of what should be included in a medical examination is presented by Dr. N. J. Roberts, Associate Medical Director of the Standard Oil Company (New Jersey) in a forthcoming article on "The Periodic Evaluation of Health." For a routine test to be justified, Dr. Roberts points out, the yield of findings "must outweigh, from the viewpoint of the frequency or importance of positive results, the cost of testing in terms of (1) the time, energy and patience of those examined, and (2) the money, and the technical or professional time, energy, skill, facilities, equipment and materials involved."[2]

### Emotional Health

IN CLOSE to half of the respondent companies having health examination plans, some attempt is made to gauge the mental and emotional health of the executive. One clinic director considers this "the most important part of the examination . . . we do more good at this level than we do in finding cancer."

Large companies seem more likely than small ones to be concerned with emotional health. In most cases, the attempt to approach this problem is made through the counseling interview with the examining doctor, though a few companies also use psychological testing. Typical comments are "repeated contacts with Medical Director," or "the doctor follows this line to assure himself that his examination is complete" or "one-hour interview stressing organizational and occupational environment."

During the interview, the doctor probes gently such topics as overwork, overtime, and whether or not the man takes vacations. He invites discussion of family affairs, and tries to find out how things are going on the job. Such an interview doesn't usually follow a set pattern; it is based on the individual's medical history and findings, on what he says and how he acts during the examination, and (if the doctor knows it) on his work situation. If the examining doctor is skillful and if the executive knows the examination is confidential, a great deal may be learned.

Every industrial doctor is likely to encounter psychiatric problems, and the need for skill in at least recognizing such problems is becoming more widely appreciated.[3]

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2. The article will appear in *The Medical Bulletin* of the Standard Oil Company (New Jersey). Content of medical examinations is also among the topics discussed by DR. GEORGE N. SAUNDERS, Medical Director of the Socony Mobil Oil Company, in an article on executive health programs in the February, 1954, AMA *Archives of Industrial Hygiene and Occupational Medicine.*



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Do executives work under special strain, and is this reflected in special emotional problems? This is a rather controversial topic, and the answers given by doctors and psychiatrists may well reflect the special conditions in their companies. "The tension is increasing," says the Medical Director of an automotive corporation. "The exasperation and frustration of dealing with unions and the government cause stresses which are reflected in the general health of the executive. Men have to retire early. This is not an old man's business." Dr. William C. Menninger feels that "the executive often achieves his success. . . . at a considerable personal cost." Psychologists and psychiatrists have frequently expressed the idea that executives are rather special people, with strong driving ambition, fear of failure, and unusual willingness to assume responsibility. They must get along with both superiors and subordinates — which means taking orders without showing resentment, and giving orders without causing resentment. They tend to overwork and hence have less time with their families. And if they have risen fast, they may also have lost contact with their origins.

Yet many industrial doctors and psychiatrists feel that there's nothing really so special about the emotional problems of executives. "No difference between the executive and the porter," snorted one psychiatrist, who has for years been counseling corporation employees. Another concedes that executives must decide big problems, but "it's no harder for a vice president to decide on a $20,000 deal than for a foreman to decide on a $20 deal. In fact, the $20 may be more real to the foreman." An industrial doctor adds: "Executives do work under great strain. Also they work too hard, eat too much, relax too seldom. But this is a picked group. Most men who want to be executives and who have managed to reach the ranks of top management have learned to take the strains in stride." (This latter consideration does not, apparently, hinder those company doctors who believe in the use of tranquilizers from handing out a great many prescriptions to executives.)

Even if the president does suffer no more stress than the porter — and this is debatable — such strain can still be considerable. At all levels, it is possible to find many employees who are tense and troubled. At least half of the people seen in an industrial Medical Department "are not actually ill but are reacting to a combination of physical, mental, and emotional factors," says Dr. Richard Walmer, managing director of the Mellon Institute Industrial Hygiene Foundation.

Even among executives, family problems outnumber job problems, in the opinion of most physicians and psychiatrists interviewed. Among the conditions observed are depression, fatigue, anxiety and psychosomatic disorders partly or wholly caused by strain.

The relationship of emotional stress to such conditions as high blood pressure, ulcers, gout, asthma, and arthritis has not been statistically evaluated, according to Dr. William P. Shepard, Vice President for health and welfare, Metropolitan Life Insurance Company. Where such illnesses are caused by stress, he suggests, this is more likely to be the result of maladjustment than of overwork. "When an executive fails," says Dr. Ralph T. Collins, psychiatrist of the Eastman Kodak Co., "it is usually because he has not learned how to manage people or/and himself."

One generalization at least seems to be valid: When an executive has serious emotional problems, his subordinates are likely to develop more problems than average. And the higher up on the organization chart the unhappiness is located, the more it is likely to spread, and the more detrimental it will be to the company.

### Statistics Can Lie

HOW HEALTHY — or how unhealthy — are executives as a group? A new study by Life Extension Examiners, one of the largest that has yet been made, covers 5,000 executives of all ages from 30 companies. The findings are considered reassuring by Dr. Harry J. Johnson, Life Extension's Medical Director. "Executives," he asserts, "are a reasonably healthy group of people with quite a good life expectancy. All this talk about the unusually high incidence of disease in their ranks is turning them into worried, fearful, and sometimes neurotic creatures. It's ridiculous. Examine any other representative group of men and you'll find them no healthier than management personnel."

Life Extension Examiners did not classify anyone as unhealthy because of minor abnormalities such as flat feet, hemorrhoids, or correctable defects of vision or hearing; but it did count as unhealthy all conditions which were considered present or potential health hazards. On this basis, 58.9% of the executives examined were found to be in good shape. The balance, 41.1%, were reported to be in substandard condition.

Significantly, the survey also brought out the fact that a feeling of good or ill health is not a very reliable indicator of one's actual physical condition. More than half of the men who were found to be in substandard condition had experienced no symptoms of ill health. In the normal-health group, 36% did have some symptoms, but the condition did not turn out to be serious. In the first group, the physical examination revealed unsuspected trouble. In the second, it relieved needless worry over health.

About one man in seven was found to be overweight — i.e., more than 10% heavier than the upper limit of the normal weight range for his height and body frame. Because of the serious consequences it can have on health, overweight was considered a disorder, and in fact many of the overweight men did suffer from other serious ailments.

Of the 5,000 executives, one in nine had organic heart disease; 8% suffered from high blood pressure. Other less common findings included hernia, prostate disorders, varicosities, suspicious moles, chronic skin rashes, anemia, ulcers, rectal polyps, colitis, diseased gallbladder and (in a very small proportion) cancer. Most of the more common conditions were found with greater frequency in men over 40, and incidence of most disorders except over-

3. Brief psychotherapy in industry is discussed by DR. LEONARD E. HIMLER in the May, 1956, issue of this journal.



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weight increased with each successive five years of age. Overweight reached its peak, in this sample, among men of 51-55; those over 60 have only the average tendency to obesity.

### Rx for Better Health

ASIDE from the injunction to take periodic physical examinations and to follow the resulting medical recommendations, if any, the advice most often given by doctors to executives adds up to this: exercise and weight control, better nutrition, better living habits — and more realistic handling of the job. This may mean refusing responsibilities beyond one's scope. It means also, for many men, cutting back to the normal work-week, enjoying adequate vacations and restful week-ends.

Even for men who follow this advice, leadership is a stressful way of life. For companies interested in minimizing the effects of stress, here are some hints from industrial doctors:

1. Do a better job of choosing management material. Choose men who have not only the ability to do the job, but the ability to withstand stress. There are medical tests which can determine physical stress endurance. Skilled interviewing, and a review of the candidate's experience, will often help to determine susceptibility to mental and emotional stress.

2. Discourage rather than reward long hours, overwork, and skipped vacations. These can be necessary occasionally, but a man who habitually spends 60 hours in his office may just be spinning his wheels. With adequate planning he can delegate, cut his workload down, and quite possibly do a better job than before.

3. Provide not only periodic health examinations, but also access to skilled medical guidance whenever needed.

It seems almost superfluous to point out that for real results the examination must be conducted by a competent physician with access to all necessary facilities, or by a competently staffed and well-equipped clinic. This physician or clinic should be chosen by a doctor, not by a layman, according to Dr. Harry E. Tebrock, secretary-treasurer of the New York State Society of Industrial Medicine, and Medical Director of Sylvania Electric Products.

The industrial physician is a specialist, Dr. Tebrock emphasizes. Besides being a good doctor in general, he should be a keen diagnostician, skilled in human relations and with some experience of industry. He should be trained in industrial hygiene and toxicology; some training in psychiatry will also be helpful. Good leads to such specialists can be obtained through universities having industrial medical departments, or through any of three organizations: the Industrial Medical Association (Chicago), the Industrial Hygiene Foundation (Pittsburgh), and the American Academy of Occupational Medicine (c/o Dr. Leonard Goldwater, Columbia University School of Public Health, New York City).

### Benefits of Periodic Examinations

IN VIEW of the findings, there can be little question of the value to the executive of a thorough periodic health examination. Is the program worthwhile from the company's point of view? The answer of the doctors and personnel men interviewed was a unanimous yes, backed up in many cases by the statement that the company was extending the program. Improved efficiency and improved morale were the benefits most commonly cited, but many medical directors said also that some lives had been saved, other prolonged, as a direct result of physical examinations.

In the article cited, Dr. Roberts shows that not only the first examination, but each successive yearly examination, uncovers important and previously undiagnosed disorders.

From a purely monetary point of view, an executive represents a tremendous cash investment. Merely recruiting a college graduate for management training can easily run into four figures, and replacing a top executive costs much more.

But such price tags don't begin to represent the real cost of executive ill-health. A man who has "cost" the company $50,000 for recruitment and training can cost it many times that amount if he makes a wrong decision or if he isn't there to make a decision at a crucial time. A good health examination program can go far to avert such losses.

It is sometimes argued against medical examinations that men who have never missed an examination can and sometimes do drop dead. This is true, but regular examinations do reduce the possibility of sudden death and, even more important, they help the man stay as healthy as possible on the job.

An additional advantage of a fairly broad medical program is the occasional discovery of pathological situations within a company. When an unusually large number of persons in one department seem to be suffering from strain, the Medical Director may, without naming individuals, alert the department head (and if necessary his superiors) to the fact that there is something wrong. The cause may vary all the way from simple overwork to some focus of emotional illness — whether it be a person or a group situation — within the department. An adequate program for executive health is fairly expensive to install. Moreover, since programs tend to become broader and broader, the expense often increases with time. But the companies that have such programs generally agree that they are well worth the cost.

# Industrial Medical Association

## *President's Page*

THE FIRST IMA President's Page, written by Dr. A. G. Kammer, appeared in the July, 1951, issue of this Journal. Dr. Kammer had been elected President at our Thirty-Sixth Annual Meeting at Atlantic City in April. He began his message by noting certain of the innovations at the Atlantic City meeting, including the adoption by the Association of its present name, and a new set of By-Laws, together with the establishment of the American Foundation of Occupational Health (now the Occupational Health Institute) for the inspection and approval of industrial Medical Departments according to IMA standards, and the considerable definite progress up to that time made toward the creation of a Specialty Board for our field of practice — evidenced, in part, by the growing interest in programs of graduate training. Then, in bold strokes, Dr. Kammer outlined the Association's future.

Soon we assemble again in Atlantic City, for our Forty-Third Annual Meeting. It is interesting to observe how almost prophetically Dr. Kammer suggested what was to happen in the intervening years. Certification of our specialty is now an accomplished fact; the Founders' group has been established; the examinations of the first group of applicants were held last year; the second group will undergo theirs in April. The membership is nearing 4,000; a continually growing number of members are participating in Association affairs, particularly as Committee Chairmen and Members, District Counselors, and officers of Component Societies. IMA is represented at meetings of organizations with similar and related interests not only nationally but internationally as well. And the Association has become a distinctive and important force in the development and application of principles and policies in industrial medical matters generally.

In addition, the headquarters offices, at 28 East Jackson Boulevard, Chicago, have been doubled in space; and Dr. E. C. Holmblad, whose career as Managing Director since 1941 has been one of dedication to "service" to IMA members, and, in many notable instances, to managements as well, now has the facilities, and — in the persons of Clark D. Bridges, as Assistant Managing Director, and Mrs. Rita Packer, as Executive Secretary — the capable staff leaders to keep abreast of the numerous and increasing demands for more and more of the same.

On the broad basis of adaptation to the changing times and their mounting complexities, our Association members are meeting their opportunities with brilliance and a sure touch. This is apparent in many ways. One evidence is in the quality of their presentations on scientific subjects — such, for example, as characterize the schedules for the sessions at Atlantic City. The Preliminary Program for these sessions — in fact for the complete Industrial Health Conference of which they are a part — has been mailed; the timetable for the near 200 papers, panels, round tables, etc., has gone to some 25,000 recipients. As usual, the days will be crowded; the hours will burst at their seams. But more about this in the next issue. . . .

DR. KAMMER concluded his first President's Page as follows: "No President of the Association has begun his term of office under more auspicious circumstances than now exist. The Association is financially in good health, it stands for a sound set of principles, the times are opportune for the promotion of these principles, and its members possess ability and energy which are equal to the opportunity."

I might well conclude this, my next-to-last President's Page, with the statement that no President of IMA has approached the end of his term with a seven-year retrospect as vivid and as fruitful as that of our Association's progress between the last meeting at Atlantic City in 1951, and the meeting now imminent at the same place, at which I will be succeeded as Chief Executive by President-Elect Dr. H. W. Lawrence. It has been a wonderful period. Moreover, it teems with auguries of its continuance.

Jerome W Shilling M.D.



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# 1958 National Industrial Health Conference

THE PRELIMINARY Program for the Sixteenth National Industrial Health Conference, to be held at Atlantic City, New Jersey, April 19-25, 1958, lists near 150 formal presentations, and almost two-score symposiums, panels, and round-table discussions, together with dozens of committee meetings, and the annual business sessions of the five participating organizations. The Conference will mark the *Forty-Third* Annual Meeting of the Industrial Medical Association (IMA); the *Nineteenth*, of the American Industrial Hygiene Association (AIHA); the *Twentieth*, of the American Conference of Governmental Industrial Hygienists (ACGIH); the *Sixteenth*, of the American Association of Industrial Nurses (AAIN); the *Fifteenth*, of the American Association of Industrial Dentists (AAID). The IMA and AAID programs are as follows:

## Industrial Medical Association

### Tuesday, April 22 — Medical Section

SYMPOSIUM on "Medical Care of Industrial Workers" — Moderator, ASA BARNES, M.D., Area Medical Administrator, Welfare and Retirement Fund, U.M.W.A., Louisville, Kentucky.

"Labor's Health Goals" — WILLIAM A. SAWYER, M.D., Medical Consultant, International Association of Machinists; Chairman, A.M.A. Committee on Medical Care of the Industrial Worker.

"The Medical Care Plan of Endicott-Johnson Corporation" — NICHOLAS I. KLIMOW, M.D., Director, Compensation Bureau, Endicott-Johnson Corporation, Johnson City, New York.

"Community Health Association Plans for Operation in Detroit" — FREDERICK D. MOTT, M.D., Executive Medical Director, Community Health Association, Detroit.

Program by National Council on Alcoholism — Moderator, JOHN L. NORRIS, M.D., Medical Director, Kodak Park Works, Eastman Kodak Company, Rochester, New York; PAUL S. MORGAN, Assistant Treasurer and Personnel Manager, Morgan Construction Company, Worcester, Massachusetts; HARRISON M. TRICE, Assistant Professor, New York State School of Industrial and Labor Relations, Cornell University, Ithaca; BERKLEY F. WATTERSON, Staff Representative, AFL-CIO Community Services, New York City; MRS. MARTY MANN, Executive Director, National Council on Alcoholism, New York City.

### Tuesday, April 22 — Surgical Section

"THE SURGERY of Trauma" — Moderator, WILLIAM D. FRAZIER, M.D., Medical Director, Baldwin-Lima-Hamilton Corporation, Eddystone Division, Chester, Pennsylvania.

"The Repair of Damaged Peripheral Nerves" — ROBERT A. GROFF, M.D., Professor of Neurosurgery, University of Pennsylvania Hospital.

"Major Blood Vessel Surgery for Traumatic Injury" —BROOKE ROBERTS, M.D., Assistant Professor of Surgery, University of Pennsylvania Hospital.

"The Problems of Internal Fixation in the Treatment of Fractures" — HUGH SMITH, M.D., Campbell Clinic, Memphis.

"Modern Concepts of Rehabilitation" — HENRY H. KESSLER, M.D., Director, Kessler Institute.

Panel Discussion "The Cardiac in Industry" — Moderator, HARRY E. UNGERLEIDER, M.D., Chairman IMA Cardiovascular Diseases Committee, Equitable Life Assurance Society, New York City; JOSEPH H. GERBER, M.D., Division of Occupational Health, Department of Health, Education, and Welfare, Washington, D. C.; C. ANTHONY D'ALONZO, M.D., E. I. du Pont de Nemours & Company, Wilmington, Delaware; S. CHARLES FRANCO, M.D., Consolidated Edison Company of New York; LEONARD J. GOLDWATER, M.D., Columbia University Faculty of Medicine, New York City.

### Tuesday Afternoon, April 22

ADDRESS of Welcome — ALBERT B. KUMP, M.D., President, Medical Society of New Jersey.

Sappington Memorial Lecture: "Everybody's Business — The Problem of Fall Out and Radiation" — C. W. SHILLING, M.D., Deputy Director, Division of Biology and Medicine, Atomic Energy Commission, Washington, D.C.

Symposium on Mental Health Problems in Industry: "Early Recognition of Emotional Problems by Industrial Physicians" — Moderator, RALPH T. COLLINS, M.D., Consultant in Neurology and Psychiatry, Eastman Kodak Company, Rochester, New York; JOHN J. THORPE, M.D., Associate Medical Director, Esso Standard Oil Company, New York City; L. E. CHITTENDEN, Manager of Personnel Relations Department, Bound Brook Plant, American Cyanamid Company, Bound Brook, New Jersey; ALAN A. MCLEAN, M.C., Psychiatric Consultant, International Business Machines Corporation, New York City; GRAHAM TAYLOR, M.D., Assistant to Director, Allan Memorial Institute, Montreal, Canada; JOHN MACIVER, M.D., Director, Safety and Occupational Health Bureau, Metropolitan Life Insurance Company, New York City.

### Wednesday, April 23 — Medical Section

SYMPOSIUM on "Convalescence Following Illness and Injury" — Moderator, F. CURTIS DOHAN, M.D., Medical Director, Radio Corporation of American, Camden, New Jersey; "Experience on Return to Work" — ALLAN J. FLEMING, M.D., Medical Director, E.I. du Pont de Nemours & Company; "The Statistical Interpretation" — SYDNEY PELL, PH.D. (Bio-statistician); "Experience in the Military Services" — Speaker from Armed Services to be designated; "Report on Symposium on Surgical Convalescence held under the auspices of New York Academy of Sciences and American College of Surgeons, March, 1958" — HENRY MOSS, M.D.

Program on Radiation — Moderator, JAMES H. STERNER, M.D., Medical Director, Eastman Kodak Company, Rochester, New York; "Facts and Fallacies About Radiation Exposure" — THOMAS L. SHIPMAN, M.D., General Electric Company, Los Alamos, New Mexico; "Diagnostic Radiation in Industry, Uses and Abuses" — W. DAGGETT NORWOOD, M.D., General Electric Company, Hanford, Washington.

Program by the Committee on Standards for Motor Vehicle Drivers — Moderator, HAROLD BRANDALEONE, M.D., New York City; "The Role of the Physician in Motor Vehicle Accident Prevention — Progress Report of Committee" — HAROLD BRANDALEONE, M.D., "The Relationship between Coronary Occlusion and Motor Vehicle Accidents" — GERALD FRIEDMAN, M.D., LAMSON BLANEY, M.D., and HAROLD BRANDALEONE, M.D.; "Health Opportunities in Driver Examination"— FORREST E. RIEKE, M.D.

### Wednesday, April 23 — Surgical Section

SMALL PLANT Services — Moderator, LEONARD ARLING, M.D., The Northwest Industrial Clinic, Minneapolis; "Scope, Objectives, Functions and Ethical Principles of Industrial Medicine" — WILLIAM P. SHEPARD, M.D., Second Vice President, Metropolitan Life Insurance Company, New York City; "Physical Requirements and Space Arrangements for Efficient In-Plant Medical Facilities" — WILLIAM J. FULTON, M.D., General Motors Corporation, Detroit; "The Medical Staff and Consultative Services" — J. F. MCCAHAN, M.D., Medical Director, Loss Prevention Department, Liberty Mutual Insurance Company, Boston; "Examination Procedures and Record Systems" —LOGAN T. ROBERTSON, M.D., Occupational Health Consultant, Asheville, North Carolina; "The Value of Small Plant Health Programs to Management" — A. D. ROSS FRASER, President, Rome Cable Corporation, Rome, New York.

### Wednesday Afternoon, April 23

PANEL on 'Occupational Dermatoses" — Committee on Dermatology: Moderator, JOSEPH V. KLAUDER, M.D., Clinical Professor of Dermatology, Graduate School, University of Pennsylvania; "Actual Causes" — JOSEPH V. KLAUDER, M.D.; "Diagnosis" — RAYMOND R. SUSKIND, M.D., Associate Professor of Dermatology, University of Cincinnati Medical School; "Prevention" — DONALD J. BIRMINGHAM, M.D., Assistant Professor of Dermatology, University of Cincinnati Medical School.

### Wednesday Evening, April 23

IMA BANQUET — Address of Welcome — DAVID B. ALLMAN, M.D., President, American Medical Association.

Greeting — HON. ROBERT MEYNER, Governor of New Jersey.

### Thursday, April 24 — Medical Section

"THE CONTROL of Acute Respiratory Diseases in Industry with Special Reference to Influenza" — Moderator, GEORGE M. SAUNDERS, M.D., Medical Director, Socony Mobil Oil Company, New York City; ALEXANDER D. LANGMUIR, M.D., Director of Epidemiology, Communicable Disease Center, U.S. Public Health Service, Atlanta, Georgia; MELVIN N. NEWQUIST, M.D., Medical Director, The Texas Company, New York City; EDWIN D. KILBOURNE, M.D., Associate Professor of Public Health and Preventive Medicine, Cornell University, Medical College, New York City.

Moderator, NORMAN PLUMMER, M.D., Medical Director, New York Telephone Company, New York City.

"Lost Time among Railroad Workers and Steel Workers in the Same Industrial Setting" — ROBERT J. HALEN, M.D., Jones & Laughlin Steel Corporation, Pittsburgh.

"Patterns of Health and Illness in Industry" — LAWRENCE E. HINKLE, M.D., Associate Professor of Clinical Medicine, Cornell University Medical College, New York City.

"Manganese Poisoning — Signs and Symptoms" — RAFAEL PENALVER, M.D., Department of Legal Medicine and Toxicology, School of Medicine, University of Habana, Cuba.

### Thursday, April 24 — Surgical Section

MODERATOR, WILLIAM D. FRAZIER, M.D.

"Disposition of Hand Injuries in a Steel Mill" — JOSEPH TAUBER, M.D., Jones & Laughlin Steel Corporation, Sewickley, Pennsylvania.

"Current Concepts in Treatment of Peripheral Venous Disorders" — NORMAN ROSENBERG, M.D., Director, Department of General Surgery, Middlesex General Hospital, New Brunswick, New Jersey.

"Practical Approaches to the Treatment of Burn Trauma" — TRUMAN G. BLOCKER, JR., M.D., Professor of Plastic and Maxillofacial Surgery, University of Texas Medical Branch, Galveston.

"The Cardiovascular Emergency" — ROBERT DRIPPS, M.D., Chief, Department of Anesthesiology, University of Pennsylvania Hospital.

"The Treatment of Chest Trauma" — ELLIOTT S. HURWITT, M.D., Clinical Professor of Surgery, Columbia University, and Chief of Surgical Division, Montefiore Hospital, New York City.

"Low Back Pain" — GEORGE S. HACKETT, M.D., Consulting Surgeon, Mercy Hospital, Canton, Ohio.

### Thursday Afternoon, April 24

COMBINED Medical and Surgical Session — "Use of Antibiotics in Industry" — Moderator, DAVID E. ROGERS, M.D., Associate Professor of Medicine, Cornell University Medical College, New York City; TRUMAN G. BLOCKER, JR., M.D.; PETER DINEEN, M.D., Assistant Professor of Clinical Surgery, Cornell University Medical College, New York City; EDWARD F. ROBERTS, M.D., Director of Clinical Investigation, Wyeth Laboratories, Philadelphia; ROBERT I. WISE, M.D., Assistant Professor of Medicine, Jefferson Medical College, Philadelphia.

Panel on "Certification in Industrial Medicine" — Moderator, JAMES H. STERNER, M.D.; participants to be announced.

## Association of Industrial Dentists

### Monday, April 21

PRESIDING — ALAN H. GREENWOOD, D.D.S., President, American Association of Industrial Dentists, Wilmington, California.

Panel on "The Many Faces of Industrial Dental Programs" — Moderator, ROBERT B. NEMEROFF, D.D.S., New York City; HARRY H. DOUGHERTY, D.D.S., Associated Industries, Wyomissing, Pennsylvania; GRANT U MACKENZIE, D.D.S., Ford Motor Company, Dearborn, Michigan; HOWARD E. DECAMP, D.D.S., Corning Glass Works, Corning, New York; CALVIN WEISS, D.D.S., St. Louis Labor Health Institute, St. Louis, Missouri.

Symposium on "Dentistry as Related to Safety in Industry" — Safety Engineer; Psychologist or Psychiatrist; Dental Summarist.

### Tuesday, April 22

"A PREPAID Dental Program" — MAX H. SCHOEN, D.D.S., International Longshore Workers Union, Wilmington, California.

"Possibility of Dental Coverage in a Health Insurance Program" — Speaker to be announced.

Panel on "Cost of an Industrial Dental Program to Management" — Moderator, K. W. MISHER, D.D.S., International Harvester Company, Chicago; E. R. ASTON, D.D.S., Pennsylvania Department of Health, Harrisburg; MAX SCHOEN, D.D.S.; Health Insurance Director (to be announced); ALAN H. GREENWOOD, D.D.S.

### Wednesday, April 23

SYMPOSIUM on "The Future of Industrial Dentistry" — JAMES DUNNING, D.D.S., Harvard University, Department of Hygiene; C. RUSSELL FRICKE, D.D.S., Duquesne Light Company, Pittsburgh; LEONARD S. MORVAY, D.D.S., Industrial Dental Consultant, Newark, New Jersey; W. B. ELVERS, D.D.S., Dental Research Department, Bristol-Myers Company, New York City.

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## Examining Physicians' Conference

**Fifty-five physicians attended the Fifth Conference of Examining Physicians of The Chesapeake and Potomac Telephone Companies held October 24-25, 1957, at the Willard Hotel, Washington, D. C. These doctors represent the Chesapeake and Potomac companies operating in the states of Virginia, West Virginia, Maryland, and the District of Columbia.**



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# OHI Certifies–

THE Occupational Health Institute awarded Certificates of Health Maintenance to the four Chesapeake and Potomac Telephone Companies serving the District of Columbia, Maryland, Virginia and West Virginia. The presentations were made by WALTER E. FLEISCHER, M.D., Counselor, Fifth District, Industrial Medical Association, at the dinner meeting of the Examining Physicians' Conference of the four Chesapeake and Potomac areas at the Willard Hotel in Washington, D.C., October 24, 1957.

Walter E. Fleisher, M.D. (left); J. R. Davis, M.D., Medical Officer, Maryland Company (center); and R. Lomax Wells, M.D., Medical Director (four companies), Chesapeake and Potomac Telephone Companies.

Dr. Fleisher; J. W. Powell, M.D., Medical Officer, Virginia Company; Dr. Wells.

Dr. Fleisher; John T. Jarrett, M.D., Medical Officer, West Virginia Company; Dr. Wells.

Dr. Fleisher; Lawrence A. Pyle, Jr., M.D., Assistant Medical Director, Washington Company (center), and C. E. Sener, Assistant Vice President, Personnel, Washington Company.

# Books

## Toward Understanding

TOWARD UNDERSTANDING MEN — Transcripts from Seminars for Business Executives: Division of Industrial Mental Health, The Menninger Foundation, Topeka, Kansas, Second Edition, 1957, pp. 229.

This loose-leaf brochure is a transcript of the recordings of the two highly successful one-week seminars for executives which were held at the Menninger Foundation in 1956 and 1957. Minimal editing of the combined proceedings has preserved in these notes the direct, informal style of the 14 lectures given by the members of the clinical staff. The group discussion summaries and the verbatim question-and-answer material reflect the active interest these executive groups had in applying psychologic and psychiatric concepts to industrial human relations.

The stated objectives of these seminars are "to help executives further their understanding of human motivation, to sharpen their interviewing and communications skills, and to enhance their effectiveness in the supervision of others." The first of the five units, opened by Dr. William Menninger, outlines some of the general principles of psychiatry applicable to industry. This is followed by a simplified description of conscious and unconscious motivation, and an animated presentation by Dr. Karl Menninger of the Freudian concept of the contrasting constructive and destructive personality mechanisms.

The lectures on the basic principles and techniques of interviewing and interpersonal communication emphasize the need for greater awareness of shared feelings, rather than for specific methods. Two lectures are devoted to an exploration of the principles underlying group participation. Case material submitted by members of the seminar is used to highlight the importance of feelings in the communication process.

Dr. Harry Levinson, Director of the Division of Industrial Mental Health of the Menninger Foundation, gives an outstandingly lucid exposition of the supervisor's role as a father figure and the unconscious expectations subordinates have of him. As

another staff lecturer put it, "How to be a good father or a good mother could be a kind of definition of counseling in supervision." In the concluding section Dr. William Menninger discusses the emotional problems of the executives, and reemphasizes the basic theme of a need for a new awareness of motivation in themselves as well as other people in order successfully to influence behavior.

A copy of this notebook is undoubtedly a treasured possession of each of the 40 executives who have been privileged thus far to participate in these annual seminars. It contains the kind of basic information which needs to be re-read and re-digested in the light of the industrialist's "new look" at his subsequent human relationships. The industrial physician too could profit from a review of this material, since it offers an excellent orientation for the type of brief psychotherapy which effective industrial medical practice demands.

—LEONARD HIMLER, M.D.

## Unusual

565 INDUSTRIAL COMPENSATION DECISIONS: Editors: RICHARD F. GONDA, J. ARLEN MARSH, IVAN W. LOUIS. Industrial Publishing Corporation, 812 Huron Road, Cleveland 15, Ohio, pp. 491, $12.50.

A more revealing title for this book might be "565 Unusual Industrial Compensation Decisions." At any rate these are not run-of-mine cases, and the majority reflect decisions of the supreme courts of several states. The 565 well condensed decisions are divided into an array of categories, all standing apart from uncontested, unlitigated matters. From these categories a few items serve as examples: Acts of God; Assaults; The "Going and Coming" Rule; The Employer's Conveyance; The Dual Purpose Trip; Deviations From Business Trips; The Employee's Personal Comfort; Social and Recreational Activities; Horseplay; Failure to Obey Safety Rules; Intoxication; Self-Injury or Suicide.

One case typifying all in terms of complexities presented to judicial bodies for decision is the following:

A Boston taxi driver became speechless. The Massachusetts Supreme Judicial Court had to decide whether his condition came about in course of his employment.

Egan, the cabbie, was returning to Boston after delivering a fare in Malden. While driving along Main Street in Everett, he slowed down when he noticed activity on the sidewalk. He saw a police officer in uniform with a gun in his hand holding three young men at bay. The officer called to Egan to stop. He did. The policeman requested Egan to go to the police station to obtain aid. At that moment, one of the arrested men put his hand in his pocket. The officer threatened to shoot the man unless he kept his hands up.

When he got to the station, Egan was nervous and excited. Two days later, while at home, he was seized with a spell of blindness. He lost power of speech. His condition was diagnosed as a cerebral hemorrhage.

It appeared to his employer that Egan became an employee of the city when he was asked for aid by the policeman.

The court found no merit in that contention. Instead, it said there was sufficient medical evidence to establish hemorrhage and subsequent paralysis arose out of experience with the police officer. And, said the court, since streets were the place of employment, risks of the street became risks of the job in Egan's particular case.

Claim allowed.

(Egan's Case: Supreme Judicial Court of Massachusetts, January 5, 1954; 116 N. E. 2d 844.)

There remain 564 decisions all equally engaging and informative for all industrial claims departments and all other persons faced with obligations in reaching conclusions as to the compensability of the extraordinary cases growing out of claims for damage by industrial workers.

## The Destroyer

FEAR: CONTAGION AND CONQUEST: JAMES CLARK MOLONEY, M.D., Philosophical Library Inc., New York, 1957, pp. 140, $3.75.

Fear is man's mortal enemy. It is strange and also paradoxical that fear which has been and is responsible for man's continued presence on earth is at the same time threatening to the perpetuation of his earthly existence. His ability to fear has saved man for posterity. Today, there are courageous men but there are no men without fear. The past's fearless dead lived too brief a life to reproduce their kind.

The mortal enemy of man is not the fear of wild animals of the jungle. Man's mortal enemy is not the type of fear that rises in fury to repel the assaults of the invader. In these situations the target is outside; is perceivable, definable, limitable, calculable, objective. Fear directed toward real objects is no menace to man's existence.

But, there is another and deadlier kind of fear. This fear is contagious fear. Choked back, it tears at its possessor with smoldering rage. This rage, denied an outside target, devours its host.

Normal fear probably does not produce disastrous consequences in the emotionally mature adult, but this normal fear is transmitted through continuity, by contagion, to the infant and hence becomes neurotic fear. This neurotic fear is the sickness that is threatening to destroy us.

Are we, then, creating the means of our own destruction? Are we developing a culture which increasingly is the source of fears in parents which result in greater numbers of neurotic individuals in coming generations? Must we, then, anticipate for our and their children a continued trend toward more widespread mental illness in the world population, until sickness of the people halts progress in technology, science, and humanism, and initiates a cyclic reversion toward primitive living?

The answer is "no" if we can mobilize sufficient knowledge and action to counterbalance the adverse aspects of cultural trends as they are now happening.

All the foregoing, taken directly from the text, provides a better picture of what goes on in this book than any formal review. Yet the author's vivid portrayal of the significance of fear in itself generates some added fearfulness.



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## Getting Older

TRENDS IN GERONTOLOGY, 2nd ed.: NATHAN W. SHOCK. Stanford University Press, Stanford, California, 1957, pp. 214, $4.50.

For any pursuit to have "trends" it must perforce have a past. Always headlights are wired in series with tail lights. Scientific gerontology relatively is so new that just barely does its past warrant "trends." Yet here they are, both in the title of this book and in most of the chapter headings such as: Trends in Population; Trends in Employment and Retirement; Trends in Income Maintenance; Trends in Health Maintenance; Trends in Living Arrangements; Trends in Education; Trends in Research.

The author's initial definition of gerontology is the scientific study of the phenomena of aging. By aging, is meant the progressive changes which take place in a cell, a tissue, an organ system, a total organism, or a group of organisms with the passage of time.

Therein the emphasis is on morphology. Yet this text foremostly is directed to the socio-economics of gerontology. By 1975 in the United States some 21 million persons at and above age 65 will be in our midst. In truth already they are here, as the middle aged citizens of the land. Worldwide birth control may constitute the present's most urgent need. Birth control cannot modify the aged population number of 1975. Yet unless that group and all other adult groups set about population control, in a few generations there may be 50 millions of the aged, with all other age groups in proportion. Gerontology and all other sciences may perish as part of earth's suicide.

## Locker-Room Medicine

SPORTS INJURIES MANUAL FOR TRAINERS AND COACHES: DONALD F. FEATHERSTONE. Philosophical Library, New York, 1956, pp. 132, $6.00.

Here is a book with which the physician in the recreation-oriented establishment should become familiar.

Any contemporary football spectator, viewer, or listener knows that when an injury occurs during play it is the trainer, not the team's doctor, who dashes onto the field to exercise his observational powers, come to a decision and render immediate care or declare the player unfit for further participation. The Manual will aid this trainer—of college squads or of industrial teams—in having greater knowledge of such items as anatomy, physiology, the role and duties of the trainer and coach, and the prevention and treatment of sports injuries. The line drawings of anatomical parts of the body are clear and accurately labeled, and the physiology of the body is reviewed in understandable, basic terms.

Stressed by the author is the need of the trainer to "speak the athlete's language," so that with the added knowledge of game lore acquired experientially, he can comprehend more readily the problems of the injured player. In describing materials for the treatment of various lesions, the listings are redolent of the strikingly (and nostalgically) aromatic air of the gymnasium anterooms. Slightly startling to today's employer of the antibiotics, the tranquilizers, and the newer chemotherapeutic agents, will be such items as lead and opium lotion, capsicum vaseline, and aconite, belladonna, and chloroform liniment, and antiphlogistine.

The author demonstrates keen insight into the motivational factors operating in the athlete, identifying and understanding the one who belittles his injury in order to return to the game, and the other who claims vaster trauma than that seen by the trainer.

He relates in some detail the rigid physical examination routine he uses in place of guesswork in trying to estimate the extent of an injury. Further, he recognizes that "in top-class athletics today, victory is as much a question of morale as of technical ability. In contests, such as the Olympic games . . . . , all the competitors are more or less champions and differ only slightly in their potentialities, so that frequently the man keyed to the highest pitch is the winner. It is therefore important to have some idea of psychology when dealing with athletes, because preparation for a major sporting event is partly a problem of mental conditioning."

Recommended is a record card system on all players, a deficiency noted in many industrial recreation programs.

In preventing sports injuries, Featherstone underlines the need for preparatory warming-up, and the best results are shown when no more than five minutes elapse between warm-up and play. Strongly pertinent in industrial recreation programs is the need for some attenuation of the efforts of athletic oldsters, or as the author has put it, "It is a definite fact that athletes over 30 years of age are not so supple or resilient as their younger comrades, taking longer to recover from injury and, sometimes, fatigue. It is, therefore, a sensible practice to grade one's training program to allow the older man to work in a different fashion from the adolescent or athlete in his early twenties." Would that all program directors did just this!

The reviewer feels that most of the discussion on injuries and their treatment by strapping and physical therapy is pertinent, but he wonders about the pouring of alcohol inside the shoe of the soccer player with a sprained ankle—to allow his continuing the game. And hasn't the concept of focal infection long been buried so that a septic focus truly is not "a distributing center for poisons to radiate throughout his entire body?" Many are the strong, uncomplaining, bemuscled men with their mouths of snags, loose teeth, and gingival exudate. Finally, the highly touted worth of the shower room foot bath with its hastily contacted solution seems to perish slowly from our thinking. Careful investigation has demonstrated the lack of guilt of the shower room floor in spreading the fungus causative of epidermophytosis.

The halftone illustrations are exceptionally clear, and the index is usable. This Manual should be made available to all of the recreation directors in America's industries so that a more intelligent approach can be made toward the prevention of those injuries that lead to time lost from work.

—JEAN SPENCER FELTON, M.D.

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ESTABLISHED 1932

Publisher A. D. CLOUD

*Volume 27* FEBRUARY, 1958 *Number 2*

# Drugs and Driving

OF DESTRUCTION and deaths from automobile accidents, there is no end. Manfully and vigorously various investigations are under way. One portion of one general study deals with drugs as they may influence driving unfavorably. This report has been made by Seward E. Miller and is published.[1] A condensation of the major observations follows:

The influence of drugs upon motor vehicle driving abilities is a significant factor in the "human performance" element of motor vehicle accidents. Physicians above all others best are able properly to advise in this area. Numerous common drugs produce in some individuals various reactions impairing their ability to drive a motor vehicle. The degree of impairment varies tremendously depending upon the severity and type of reaction. Physicians administering drugs known or likely to produce reactions impairing sensory, mental or physical functions have a clear obligation fully to inform their patients concerning this matter.

In addition, some patients experience unusual reactions to drugs that ordinarily do not impair driving ability in most individuals. Physicians ever must be alert to this possibility and be on the look-out for unusual reactions, allergic or otherwise, that impair sensory, mental or physical functions, making it unsafe to drive. Such patients also must be firmly advised not to drive a motor vehicle until the hampering symptoms have been eliminated. The time required for recovery is astonishingly long for many drugs. Some allegedly "short acting" hypnotics may cause impairment as long as 24 hours from a single dose.

1. *J. Michigan State M. Soc.*, September, 1957.

The drowsiness induced by analgesic (narcotic) drugs sufficiently damages sensory functions and reaction time that patients so afflicted should not drive a motor vehicle. In addition, morphine, its derivatives and the synthetic narcotics such as Demerol, cause varying amounts of euphoria, inability to concentrate, apathy, dimness of vision, and rapid flow of uncontrolled thought. Patients under the influence of these drugs should not drive a motor vehicle.

Hypnotics and sedatives not only depress central nervous system activity, producing drowsiness and sleep, but also they may produce motor and sensory changes. No doubt small doses of some of these drugs quieting a highly excited and "jittery" patient actually temporarily may improve his driving ability. However, this is not the usual circumstance; therefore, it is best to advise patients taking hypnotic doses of these drugs not to drive a motor vehicle.

During the initial period of administration of tranquilizing drugs (reserpine, meprobamate, chlorpromazine, etc.) some drowsiness frequently is experienced. Also, from large doses, the accompanying hypotension may occasionally produce short episodes of faintness or giddiness. Therefore, during the initial phase of dosage adjustment, patients should not drive a motor vehicle.

Although central nervous system stimulants (Benzedrine, etc.) temporarily increase alertness and efficiency, large doses in some individuals may produce headache, agitation, irritability and a decreased ability to concentrate. In all individuals, a period of fatigue and depression follows the initial stimulation. An individual may take one of these drugs to prolong the period of alert



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driving for a period of two hours, but not longer. After this two-hour period, the patient should cease driving. The dosage should not be more than 5 or 10 mg and should not be repeated that day.

As to antihistamines and drugs preventing motion sickness, there is great individual difference in reaction to these drugs, with dizziness and/or drowsiness occurring fairly frequently. Moreover, it is unpredictable in which individuals or with which preparations dizziness and/or drowsiness will occur. Patients under these medications should not drive a motor vehicle until it has been established by prior trial that they do not experience dizziness or drowsiness to the specific preparation administered.

In full dosage of anti-infective agents (e.g., streptomycin), undesirable reactions of nausea, loss of sense of balance with dizziness, ringing in the ears, and deafness may occur. A patient developing such symptoms should not drive a motor vehicle. Patients receiving over 1 gm of streptomycin daily should be watched carefully for the development of any of these adverse symptoms.

Hallucinogens (marijuana, etc.) have singular abilities for changing normal emotional reactions, even causing individuals to become oblivious or indifferent to their surroundings. Individuals under the influence of these drugs should not drive a motor vehicle.

With the exception of marijuana, any of the mentioned drugs might be prescribed any day. In behalf of the patient and in behalf of the auto travelling public, such prescription should lead to the temporary proscription of auto driving.

## Hypothyroidism in Industry

FOUR and five decades ago, diagnoses of hypothyroidism were of high frequency. The severity encountered often did not warrant the label of myxedema, and cretinism was not the contemplation. The patients involved were not profoundly ill. The majority were little aware of their abnormality, and many were at work tasks. These individuals might be observed to have dry, mildly edematous skins, subnormal temperatures, to complain of being cold, and to be given to minor hair loss and often overweight. Foremostly, they were mentally sluggish and unalert. The judicious use of small doses of thyroid extracts frequently controlled the condition.

In more recent decades this diagnosis has become less frequent and the condition has been related to more complex states connected with the pituitary and adrenals. Now, in a measure, that state has been rescued from partial oblivion by Lowrey, Ware, and Starr, in their article "Hypothyroidism in Men in Industry."[1] There is scant reason to believe that hypothyroidism is any more frequent in the working population than among the general population of comparable age. Yet the fact that the investigation they describe was carried out among industrial workers, peculiarly identifies it with industrial medicine.

Of 2,807 specimens from blood donors and men in industry, 340, or 12%, had serum protein-bound iodine values of 4.0 micrograms or less per 100 cc. In a selected group of 610 "white collar" workers, 52, or 8.5%, had similar low values. Careful reexamination of a sample of the latter group indicated that at least 75% of them had hypothyroidism needing treatment. Further analysis of the factors producing hypothyroidism and the validation of the incidence found, is warranted. If the incidence observed in this study is confirmed, these findings indicate that 6% to 9%, or more than a million middle aged American men have hypothyroidism.

In this selected group, it is no surprise that the history was of positive value in only one instance of thyroidectomy. Multiple complaints were admitted, but only that of tiredness or lack of energy was a general one. Fourteen men were overweight at the time of the interview; five others had dieted successfully. Except for a palpable thyroid gland in three cases, there were no helpful physical findings noted. Six of the 24 men had previously been diagnosed as hypothyroid. Only three of the six had been taking thyroid extract regularly, and in only two instances was the amount being increased periodically as indicated by serial determinations of PBI. Two were taking a small amount of thyroid extract intermittently.

Long ago Osler noted as to thyroid therapy, "The results as a rule are most outstanding — unparalleled by anything in the whole range of curative measures. Within six weeks, a poor, feeble-minded, toad-like caricature of humanity may be restored to mental and body health."

In every industrial plant there are a few toad-like creatures. It is possible that some may be the unfortunate victims of inadequacy in the functioning of their thyroid glands.

1. *California Med.*, 87:285 (November) 1957.